September 6, 1948

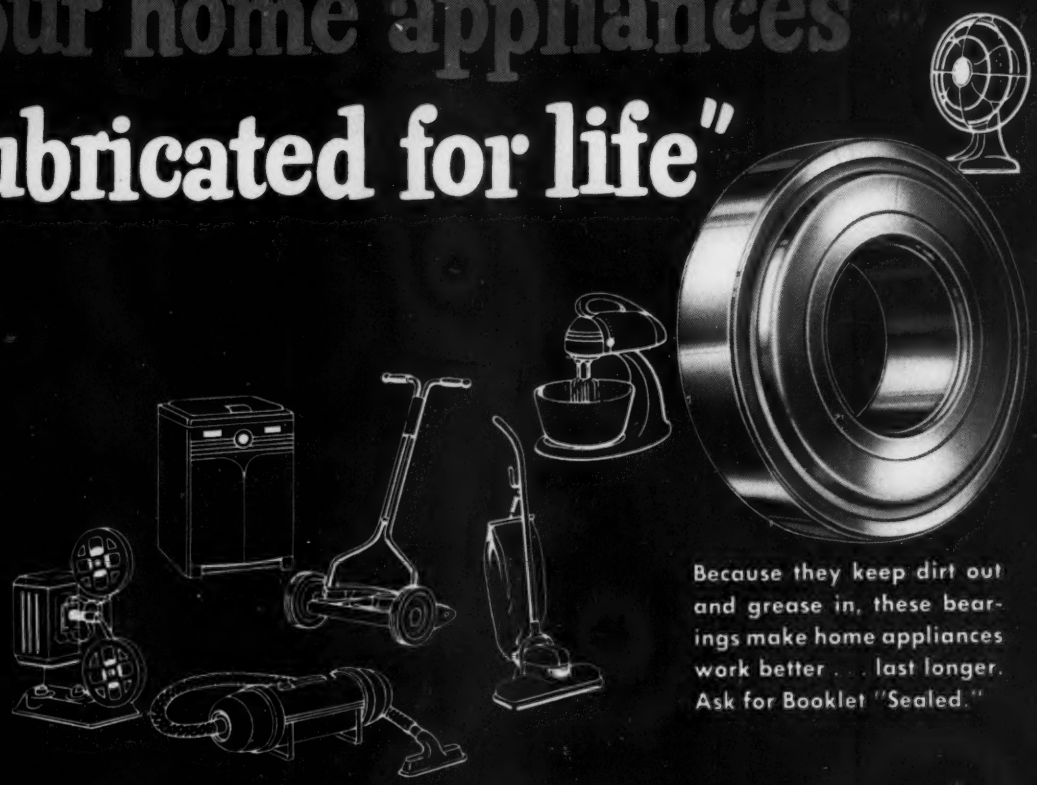
STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

EDITORIAL INDEX, PAGE 53

New Departure Sealed-for-life Ball Bearings help make your home appliances "Lubricated for life"



Because they keep dirt out and grease in, these bearings make home appliances work better . . . last longer. Ask for Booklet "Sealed."

Sealed and "Lubricated for life" Ball Bearings
Originated, developed and –
Built to be forgotten by

NEW DEPARTURE

nothing rolls like a ball...

NEW DEPARTURE · Division of GENERAL MOTORS · BRISTOL, CONNECTICUT

Is THIS the pump you need?

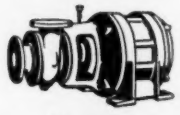
THE *Electrifugal* PUMP

IT'S COMPACT Pump and motor are combined in one rigid cast iron frame. Fits easily into close quarters—is quickly installed as a "package," and operates in any position—no shafts to align. Just bolt it down, make power and pipe connections, and start pumping. Capacities 15 to 1400 gpm, heads to 500 ft.

IT'S EFFICIENT Drip-proof motor is of Allis-Chalmers Lo-Maintenance design, specially built for pumping service. Pump has such long-service features as bronze wearing rings, new plastic water seal, five or more rings of packing, and first class construction throughout. Every unit is factory tested for efficiency, capacity and head.

IT'S AVAILABLE Many sizes of the Electrifugal and other smaller Allis-Chalmers pumps are now in stock for immediate delivery. Perhaps the size you need is ready. Phone or wire your nearest Allis-Chalmers office or dealer for up-to-the-minute information on availabilities and deliveries. For information on the complete A-C line of centrifugal pumps, ask for Bulletin B6059D. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN. A 2381

PEDRIFUGAL
The new A-C pump for flexible Texrope V-belt drive. Capacities to 500 gpm, heads to 100 ft.



SS UNIT
Close-coupled pump and motor units, made in 234 standard ratings, to 2500 gpm.

Electrifugal, Pedrifugal, SS Unit and Texrope are Allis-Chalmers Trademarks.

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment—Biggest of All in Range of Industrial Products

Rubber laundry for potatoes

A typical example of B. F. Goodrich product improvement

THOUSANDS of potato growers lose money every year because of a fungus (rhizoctonia, if you want to be technical) which attacks their potatoes and causes black spots that don't hurt taste but do harm sales.

A grower found that tumbling the potatoes in a big revolving drum of alkaline solution removes the fungus and cleans the potatoes perfectly—700 to 800 bushels an hour. Drum (upper right in the picture) is six feet in diameter and 49 feet long.

But the chemicals used ate through the steel. B. F. Goodrich engineers were called in. They worked out a rubber lining for the "potato laundry"—a rubber compound that would not be harmed by the corrosive solution, tough enough to resist the abrasion of potatoes, yet soft enough to prevent injury to potatoes which would start rot.

B. F. Goodrich men solved this problem quickly because they created the science of rubber lining and have had more experience in it than anyone else. The entire system of transporting chemicals, formerly dangerous and costly, has been made safe and cheaper by B. F. Goodrich methods.

Plating, pickling, storage, and processing tanks, used in thousands of factories can be lined with B. F. Goodrich rubber, and last so much longer, are so much safer for workmen, that they have become a regular item in the B. F. Goodrich line.

Whatever you buy of rubber or plastics, it pays to check regularly to see what improvements BFG has made in it recently. *The B. F. Goodrich Company, Industrial Products Division, Akron, Ohio.*

B.F. Goodrich
RUBBER FOR INDUSTRY

Behind the Scenes...

Heat Rash

You'd think that Shrdlu would have more respect for his old broken down boss than to walk out on him in the middle of the hottest !*'%!"**/ weather we've had all year. He called a couple of days ago to describe in detail how downright comfortable a hammock can be, but that didn't really bother us in the least. We weren't even jealous when he rattled the ice in his tall, cold Tom Collins. We did get just a wee bit upset when he explained that his entire costume consisted of one very brief pair of trunks, but what really got us was when we learned that he had all four of his kids working like beavers rubbing him slowly with eau de cologne ice cubes while his little woman stood and held the electric fan just so. That, for our dough, is carrying things a mite too far and Shrdlu's puzzle for next week may be just how he's going to get his job back.

Home Life At Work

The Durham Manufacturing Co. up in Durham, Conn. has been a good subscriber to STEEL for some time but it wasn't until just the other day that we realized what a pleasant place it must be to work. We asked several companies for pictures of their plants and Durham's president F. E. Korn came right back with both some exterior and interior shots

of their modern plant in which they manufacture steel cash boxes, first aid and automotive supply cabinets and special display cabinets of various types. They've been in business since 1922 and now employ between 50 and 100 workers, all of which is normal enough and we probably wouldn't have been unusually interested except for the photograph of their office building which Mr. Korn sent along. This, we'll have you know is the office of the Durham Manufacturing Co. and it's as nice a looking home as you'll find in any residential district. It certainly looks like it should have a cozy kitchen and breakfast nook in which to have the morning coffee klatch, and if it turns out it doesn't we're going to be mighty disappointed.

Die-Hard Hard Dies

"RKC" from Chicago comes through with a "hats off to Fred Lovell, chief hot-head for Oliver Iron & Steel Corp." As Mr. C. points out Fred's hard die inserts (see p. 108, STEEL, August 23 issue) have a long life, making them die-hard hard dies, and furthermore he's reduced the die cost per unit by 350 per cent. Jeepers, before inflation set in, we used to think that 100 per cent was as much of a reduction as there was!

Thank You, Mr. Quinn

Some day we're going to take time out and find out how it ever got that name, but in the meantime we certainly have no quarrel with Jersey Shore, Pa., home of the Jersey Shore Steel Co., whose J. D. Quinn, in a letter just received has these nice things to say. STEEL has already done a good job of price reporting on steel products and has done a very good job for the steel industry on all matters. We appreciate your efforts very much.

Ho Hum

With the help of *Science Digest* we're going to steal Art Allen's mantle (not literally) and give you a Mirrors of Motordom prediction for 1960: The rear-engined auto of that year will be equipped to help relieve the misery of hot weather driving somewhat by the added convenience of a tray of ice cubes; the kiddies riding in the back seat will be able to enjoy television through the receiving set (the driver will have to wait until he parks since frontseat television receivers are prohibited by law); the car will have added features such as an underseat toilet and a compartment for telephone and directory. Of course, you can already sleep in a Nash, so about the only thing else needed is a kitchen under the hood, using exhaust gas for cooking and people will have no need to ever leave their cars. Thus will the housing shortage disappear.

Shrdlu

(Editorial Index—page 53)

STEEL
Vol. 123—No. 10 September 6, 1948

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Business Staff on Page 4

NEXT WEEK . . .

Fundamentals of Forging Practice—Part VIII

Straight-Line Heating of Long Metal Stock

Tool and Die Materials—Selection, Application—Part V

Future Scrap Sources

STEEL

The Magazine of Metalworking and Metalproducing

VOL. 123, NO. 10 SEPTEMBER 6, 1948

NEWS

★ As the Editor Views the News 55
★ News Summary 59
Labor Recruiting Reviving 61
Foundry Iron Supply Fears Eased 62
Few Surplus Iron and Steel Plants Left 63
Armed Forces Allocation Approved 64
Steel Group Buys Interest in Butler To Assure Ore Reserves 65
Basing Point Data Sought by Capehart Committee 66
Purchasers Grow Cautious 67
★ Windows of Washington 68
Wrong Road for ERP? Germans Think So 71
Stockpiling Speeded Up by Munitions Board 72
★ Calendar of Meetings 73
★ Mirrors of Motordom 75
Auto Prices—1941 Vs. 1948 76
Steel Improvement Expands for More Jet Component Output 78
★ Briefs 79
★ The Business Trend 80
★ Men of Industry 82
★ Obituaries 87
★ Construction and Enterprise 171

TECHNICAL

★ Engineering News at a Glance 89
How to Machine and Finish Aluminum Alloy Castings 90
Diversified Application of Stainless Clad Steel 95
Cutting Tool and Die Materials—Part IV 96
Output of Tin Plate Gages Increased 74 Per cent 111
★ Progress in Steelmaking—Applied X-Ray Metallography 114
Factors Affecting Stabilization of Stainless Steels 119
Metal Stampings Held Answer to Armed Forces Needs 120
Lathe Facing Fixture Jumps Production Time Percentage 122
★ New Products and Equipment 145
★ Helpful Literature 149

MARKETS

★ Market Summary 151
★ Market Prices and Composites 152
Stockpiling Estimates Increased 156

★ *Index to Advertisers* 182

Editorial Index available semiannually; STEEL also is indexed regularly by Engineering Index Inc., 29 West 39th St., New York 18

★ Denotes regular features

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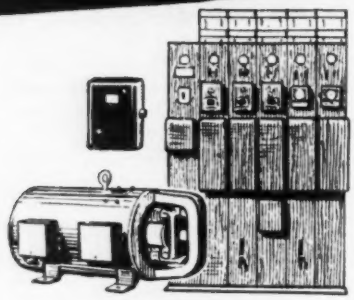
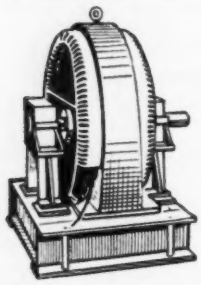


INDUSTRIAL-TRUCK BATTERY-CHARGERS

In 1910, The Electric Products Company introduced the first Automatic Battery Charger.

ASK FOR BULLETIN 203



SYNCHRONOUS MOTORS

From stator frame to rotor windings, E.P. Specialization is your guarantee of long life and trouble-free operation.

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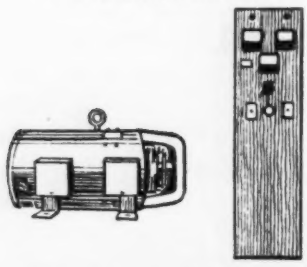


STANDBY BATTERY-CHARGERS

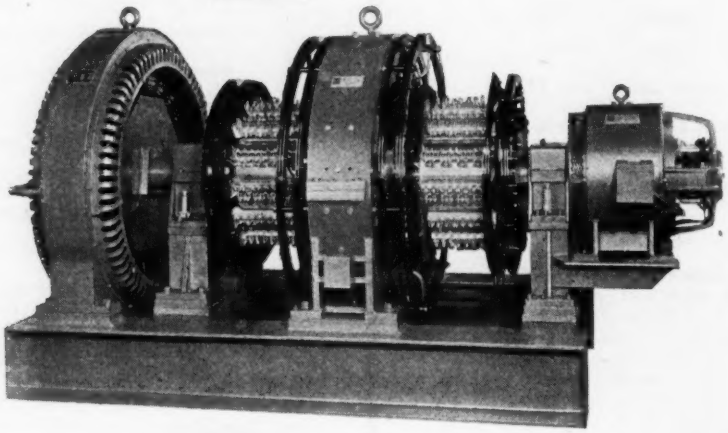
Diverter-Pole Motor-Generators assure maximum battery life, full-automatic operation and protect themselves against harmful overloads.

ASK FOR BULLETIN 207

also
INDUSTRIAL DYNAMOMETERS
SPECIAL MOTORS AND GENERATORS
FREQUENCY CHANGERS
SYNCHRONOUS GENERATORS

SHOULD WE SAVE PENNIES... *or DOLLARS?*

... use an EP motor-generator



IT'S not the first cost that counts . . . it's the price of the equipment plus the cost of installation plus the expense of operation and maintenance. Lower life-time cost is the way to save DOLLARS. That's why the E.P. Motor-Generator has been selected to supply hundreds of thousands of direct-current amperes throughout the metal-working industry for electroplating, electrocleaning, electrotinning, electrogalvanizing, electropolishing and anodizing.

Designed specifically for electrolytic processes, the E.P. Motor-Generator reduces power bills because of its life-time efficiency of 75% or better; assures more amperes per dollar because it can safely handle heavy overloads; and requires no special protective equipment like expensive forced-draft ventilating or high-cost vaults.

Thirty-four years of operating experience prove that E.P. Motor-Generators give economies of operation unmatched by any other source of direct current.

EP X-52

THE ELECTRIC PRODUCTS COMPANY

1720 CLARKSTONE ROAD CLEVELAND 12, OHIO

September 6, 1948

Whither U.S.A.?

In a foreword to the 32nd annual report of the National Industrial Conference Board, Inc., President Virgil Jordan makes this thought-provoking statement: During the past year "the process of internal and international collectivizing of the American economy and the American government has been pushed forward an immense distance at great speed. With scarcely any consciousness on the part of the public and the business community, and with the general approval and support of all parties and groups, the basic ideas, policies and programs of internationalization and socialization of the American economic and political system which were developed and applied during the preceding 15 years of New Dealism have been so firmly consolidated and rapidly extended during the past year that a free economy under limited government in this country is swiftly becoming little more than a rhetorical fiction or a sentimental reminiscence."

Doctor Jordan goes on to say that "since few are yet aware of the reality of these profound alterations in the foundations of American life, or of their certain effects upon the future condition and prospects of the individual American, the task both of mental and practical adjustment to them will be difficult."

These sober words of an eminent authority seem to ascribe a state of finality to the present order which many persons will find difficult to accept. Business men particularly, while agreeing that Doctor Jordan's appraisal is not exaggerated, will question whether the present state of affairs will continue unchanged.

This very point may well prove to be the major, although perhaps unheralded, issue of the strenuous presidential political campaign which will begin in earnest this week. Candidates and parties will discuss many problems but in reality most of them will be details of the broader issue of whether the American people wish to swing farther toward collectivism and socialism or toward a freer economy under a more limited government.

The check to the political drift leftward, which was administered by the people's vote two years ago, has been reflected only faintly in the nation's life. If, as expected, the public in November registers a more positive desire to continue rightward, that wish progressively will show more clearly in the handling of national affairs.

* * *

RECORD IS BEST BASE: At a conference by the Justice Department on small business, Assistant Attorney General Herbert A. Bergson stated that the work of the department's Small Business Unit "has been made difficult because of the general use of the historical record of purchases as the basis for the allocation to customers in short supply. This method of customer selection," he explained, "has operated to the great disadvantage of small concerns."

This statement unquestionably is true, but it would be improper to blame use of the historical record of purchases for all of the hardship cases of small business. Everybody must agree that the historical record is a logical starting point for allocating scarce materials. The government used the historical record as the basis for determining excess profits taxes during the war. There is abundant precedent for use of the historical record.

However, historical record—for whatever pur-

(OVER)

pose used—never has met all situations. Abnormal cases have to be handled by other means. Just as Sections 721 and 722 of the Internal Revenue Code were designed to give relief to corporate taxpayers whose historical record was lacking or distorted, so should exceptions to and modifications of the historical record method of allocation be employed to ease the plight of non-record buyers.

Possibly suppliers generally have not been flexible enough in adapting their allocation rules to hardship cases. Nevertheless, it would be a mistake to abandon or change too drastically the historical record as a base. It covers more individual procurement cases equitably than could any other system. —p. 70

* * *

IMPROVES STEEL "MIX": Steadily and often without fanfare steelmakers are seeking a better balance of production facilities. Progress by Jones & Laughlin Steel Corp. on its program for improving hot rolling facilities at Cleveland now permits it to sell an old 30-in. hot strip mill to Alan Wood Steel Co. This will give Alan Wood 218,000 tons additional finishing capacity to help match its semifinished capacity. Ford Motor is rebuilding three open-hearth furnaces, increasing capacity of each about 30 per cent. Youngstown Sheet & Tube Co. begins work on a continuous butt weld pipe mill at Indiana Harbor with capacity of 120,000 to 150,000 tons annually.

These are typical of improvement programs being carried on throughout the industry. While they do not increase capacity spectacularly, they make possible a better "mix" of finished product. This helps to fit facilities more closely to current needs. —pp. 63, 76

* * *

ERA AIDS CLAD STEEL: Although stainless-clad steel is a relatively young member of the family of finished steel products, its economic and metallurgical advantages give it a promising potential for diversified applications. Thus far it has been used in the manufacture of shower stalls, back bars, sink tops, refrigerators, water coolers and various architectural and appliance items. Also several truck and bus companies are ordering clad sheet material for use in the production of gas tanks, bumpers, guards and grills.

Until recently stainless-clad material, while considered seriously for applications in the automotive and architectural industries, was not specified in some instances because of its cost. Under current conditions, when labor costs are high in relation to material costs, the economic advantage of stainless-clad steel is heightened and the chances for its more extensive use for production items are more favorable. —p. 95

* * *

PACK AND SHIP SAFELY: Every now and then something happens which causes manufacturers of a common product to seek better ways to pack and ship it. Porcelain enamelers have suffered mounting losses from merchandise shipping damage. This has resulted not only in expensive waste of enameling capacity and scarce steel but also in higher than average freight rates because of damage claims.

Enamelers propose to correct this situation by launching a packaging and shipping standardization program. Testing equipment will be set up to simulate transportation hazards such as flat wheels, road bed vibration, bumping cars in yards, truck movement and manual handling of packages. It is hoped that data from these tests will point the way to standards in packaging and shipping that will cut losses appreciably.

This is a commendable undertaking. Perhaps manufacturers of some other products should look at packaging and shipping critically—before their losses get out of hand. —p. 67

* * *

$12 BILLION BACKLOG: A comparison of prices of 34 automobiles as of September, 1948, with those advertised for the same cars in 1941 shows that during this period the average price increase per car—unweighted for production volume—is $942 or 87.7 per cent. In 1941, eighteen of the 34 makes were priced under $1000. Today the lowest figure is $1371.

In view of the sharp increase in price, which on some models exceeds 100 per cent, one would think that after several years of high production signs of customer resistance to high prices would be discernible. Such resistance that may exist is more than offset by unsatisfied demand. Unfilled orders for passenger cars on the books of new car dealers are estimated by the National Automobile Dealers Association at 7,300,000 on July 1, a gain of 11 per cent over the backlog of Jan. 1.

At today's prices 7,300,000 cars would cost eager customers about $12 billion. At the present rate of production, 26 months would be required to fill the orders. —p. 76

E. L. Shaner

EDITOR-IN-CHIEF

News Summary

MEN WANTED—Boeing Airplane Co., Seattle, looking for additional manpower to build the growing number of planes the government is ordering in its preparedness program, is going further than to hang out the "Men Wanted" sign. It is reaching out into midwestern cities with aircraft labor recruiting offices (p. 61), reminiscent of wartime years. Because of a labor dispute at the Seattle plant, unions claim the move is strikebreaking, and with pickets and newspaper advertisements are urging the public to ignore the employment offers. Even though labor supply is tight, employers generally are unconcerned over the recruiting. The offered wages, they feel will not induce many men to move such a great distance, particularly when there is no incentive, such as in wartime, to move into an essential industry.

REPRIEVE—Many foundrymen breathed easier upon announcement Republic Steel Corp. and Kaiser-Frazer Corp. had reached an agreement (p. 62) whereby the former would continue to operate until next May the Cleveland blast furnace which has been the subject of much controversy in the last several weeks. However, this is looked upon by 400 foundry iron customers as assurance of a continued supply of metal for only a short time, so their worry now is for the long-term, inasmuch as control of the government-owned stack remains to be finally determined.

ALLOCATION APPROVED— A voluntary plan allocating steel to meet requirments of the armed forces now bears official approval of Commerce Secretary Charles Sawyer and Attorney General Tom Clark (p. 64), and requests for compliance with the plan are being sent to steel producers. Monthly allocations to the armed forces and to persons who need steel to fill contracts for the armed forces are set at 102,505 tons. Also newly approved is a voluntary allocation plan providing 59,000 tons of steel to makers of factory-built steel houses (p. 64). Among groups seeking allocation programs are the bituminous coal industry and the rain-carrying equipment industry (p. 64).

CENTER OF ATTENTION—Small business has been in the limelight (p. 68) in connection with its acute problems of materials procurement, particularly metallics. Despite all the solicitude of Congress and the administration for small manufacturers, it appears there is very little chance that voluntary allocations will go beyond the plan set up under Public Law 395 which confines procurement assistance to a few economic groups.

SPEED UP STOCKPILING— National security, the Munitions Board says, requires a speed-up in stockpiling of critical materials (p. 72), and consequently purchase of 67 materials is being accelerated. Only a fourth of the materials planned for the national stockpile has been purchased, and procurement of the rest in the face of rising prices may necessitate enlarging the program's original goal—$3,403,000,000.

FAVOR BASING POINTS— In assembling data for its study of pricing, the Senate Trade Policies Committee asked industrial groups and labor organizations for their views on Supreme Court and Federal Trade Commission action against the basing point, zone and similar systems of pricing. Only one letter in a flood of mail (p. 66) opposed these methods.

HERE AND THERE IN INDUSTRY— Steel Improvement & Forge Co., Cleveland, has completed a $300,000 expansion program (p. 78) which will permit a three-fold increase in production of forged gas turbine blades for the Air Force's jet engine program . . . . Electro Metallurgical Co. will start construction soon (p. 78) on a ferroalloy plant near Marietta, O. . . . . Prices for 14 makes of 1948 autos are up an average of $942 or 87.7 per cent over 1941 (p. 76) . . . . . Anticipated widespread shift by the metalworking industry from rail freight to cheaper truck transportation has not materialized (p. 66) . . . . . U. S. exports of iron and steel are declining steadily (p. 71) despite earlier predictions that European Relief Program requirements would skyrocket them.

Steel Hard to Get?

Demand Still Exceeds Supply But . . .

. . . this is a typical view of night loading operations at a Ryerson steel-service plant. The steels specified on several orders are on their way to a loading platform for delivery the following morning. Possibly none of these orders are completely filled—however, the fact remains, we are doing our very best to serve a large group of steel users.

Unfortunately, it often seems that the particular steel *you* want is never on hand, and it is true that we are always short of some kinds and sizes. But our stocks turn over fast. A size that is out today may be in tomorrow. And in spite of current conditions, we still believe the over-all stocks at our thirteen plants are the nation's largest.

Carbon and alloy steels, hot rolled or cold finished, and stainless steel in practically every analysis and finish are in stock, ready for your call. So do not hesitate to get in touch with us —on any requirement. You'll find that every Ryerson steel man will do everything possible to help you get the steel you need, when you need it.

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Labor Recruiting Reviving

With military plane orders piling up as preparedness program gains momentum, Boeing Airplane Co. reaches into Midwest for workers for its Seattle plant

REMINISCENT of wartime years, aircraft worker recruiting offices have sprung up in several midwestern cities.

Questions have arisen as to the incentive for opening them. Do they mark revival of the aircraft industry as a formidable competitor with other industries in the already tight labor market? It is known the government has placed orders running into the billions of dollars for airplanes for the new military preparedness program. Or are the offices merely an outgrowth of a labor dispute?

Boeing Sets Up Offices—It happens these employment recruiting offices have been set up by Boeing Airplane Co., Seattle, where an Aeronautical Mechanics Union (Independent) strike has been in progress since April.

However, production continues at the plant and reportedly is being stepped up. With many new government orders on the books, Boeing's employee recruiting aim, according to company representatives, is to add 3000 workers by the end of September.

Mixed Reaction—Opening of Boeing recruiting offices has met with mixed reactions. Despite the generally tight labor market, representatives of industries in some of the cities where the Boeing offices are operating have little fear that the supply will be perceptibly reduced.

Pay rates advertised by Boeing are $1.15 to $1.95 per hour for day shift and $1.25 to $2.05 for night shift. These, it was pointed out, are approximately the same as those prevailing in the areas where Boeing is recruiting, and therefore it was viewed as unlikely that many men would choose to move such a distance.

Labor organizations looked upon the Boeing recruiting program as strikebreaking. At Cleveland, placard-bearing pickets paraded in front of the Boeing employment office to discourage applicants, while in Milwaukee where another Boeing office was set up, an advertisement of District No. 10 of the International Association of Machinists called the recruiting program an effort to break the Seattle strike and urged the public to ignore employment offers.

No Government Assistance—As long as a strike is in progress at its plant, Boeing is largely dependent on its own efforts to employ workers, for government employment offices do not provide assistance to struck plants.

Boeing, which has stated in its advertisements that it is building a new permanent work force, has seen its backlog of orders expand considerably in recent weeks as result of renewed activity in national preparedness.

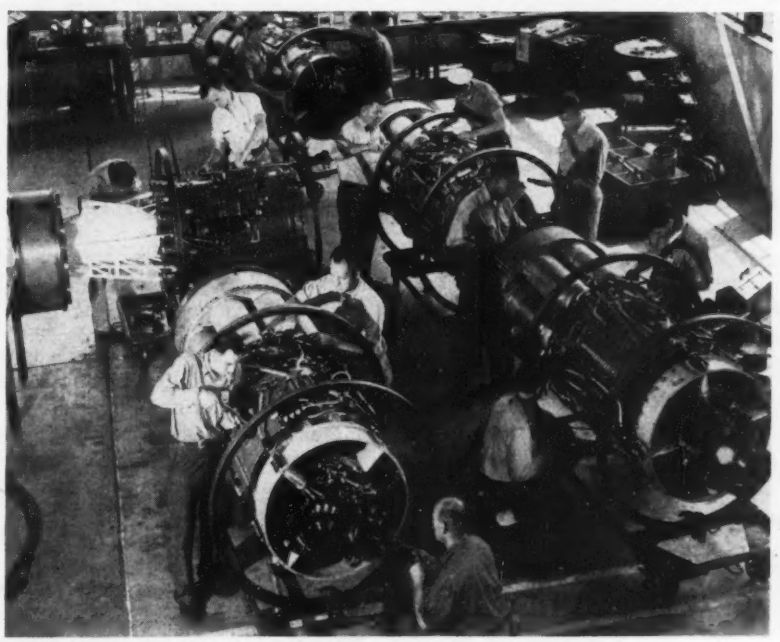
On June 30, 1948, the company had unfilled orders totaling $307,715,647, and this did not include 162 additional B50s which it had been authorized to proceed with. At the end of December, 1947, its unfilled orders amounted to $230,540,000, of which $80,260,000 were commercial and $150,280,000 were military. On June 30, 1947, the total backlog was $226,557,117.

Aircraft Output Moves Upward

REFLECTING increased momentum in the preparedness program, June output of complete aircraft (measured by airframe weight) rose 48 per cent over that of May and hit the highest point since the postwar peak of May, 1946. The June weight was 4,195,000 lb, compared with 2,843,700 lb in May, according to the Department of Commerce.

Shipments to United States military customers in June amounted to 227 aircraft with a total airframe weight of 2,828,200 lb, compared to 141 aircraft weighing 1,446,100 lb in May. The June military aircraft represented 67 per cent of the total airframe weight produced that month; personal-type civil aircraft accounted for 16 per cent, and shipments of transport-type civil aircraft, 17 per cent.

Civil Planes Shipped—In addition to the 227 military aircraft, 959 civil



JET REPAIR: Navy has established this repair station at Alameda, Calif., first of its kind for the repair and maintenance of General Electric-designed J-35 jet engines. This power plant is used in the Navy Fury which has a speed of over 550 miles per hour and the exceptional rate of climb of a mile a minute. NEA photo

planes valued at $16.8 million were shipped in June, an increase of 18 per cent in number but a decrease of 12 per cent in value from the 812 civil aircraft valued at $19 million shipped during May.

Total power output of aircraft engines produced in June was 2,014,000 horsepower, of which 1,393,500 hp were military and 620,500 hp civil.

Employment in both aircraft and aircraft engine plants showed a slight increase from May to June. Aircraft plants reported 140,382 employees in June and 136,542 in May; engine plant employment in June was 34,741, compared with 34,043 in May.

Manufacturing Employment Up

INCREASED activity in the preparedness program is strengthening demand for workers in industries producing aircraft components.

While the number of new people required for this work is small compared with wartime needs, the step-up in hirings is reported to be reflected in climbing manufacturing employment. In July, manufacturing employment in the nation, according to the Department of Labor, rose to 12,957,000 workers over June's 12,955,000. The May level was 12,740,000. Likewise, nonagricultural employment moved up from 45,046,000 in June to 45,059,000 in July, highest level on record except for last December.

Military Draft—Although the military draft will soon start taking men, it is expected by employment experts to have little immediate effect on the overall labor supply.

To Pay Identical Wage Scales

WAGES of civilians employed by the Army and Air Force will be co-ordinated by the new Joint Army & Air Force Wage Board, which supersedes the War Department Wage Co-ordination Board.

Under the new board identical wage schedules will be established for approximately 300,000 employees at Army and Air Force installations.

Harvester Strike Settled

REACHING of a new contract agreement ended last week a 16-day strike of United Automobile Workers-CIO at International Harvester Co. plants in six cities.

Under the new contract, employees will be paid for six holidays regardless of when they fall. Under the old contract, workers were paid only for holidays on which they worked.

Principals in dispute over government-owned Cleveland blast furnace are shown here as they met in Washington. Left to right are WAA Administrator Jess Larson; Henry J. Kaiser; Sen. Kenneth Wherry, chairman of the Senate Small Business Committee; and Republic's president, Charles M. White

Foundry Iron Supply Fears Eased

FOUNDRYMEN throughout New England, the East and Midwest breathed easier last week following announcement of terms of an agreement between Republic Steel Corp., Cleveland, and Kaiser-Frazer Corp., Willow Run, Mich., for operation of a government-owned blast furnace at Cleveland.

The agreement assures 400 foundry iron customers of Republic continued supply of metal at least until May 1, 1949, and possibly until Nov. 1 of next year, provided Kaiser exercises, by Jan. 15, an option for extension.

Control of the furnace, however, remains to be finally determined, and foundrymen will continue on the uneasy seat with respect to the long-term in the matter of iron supplies, until final disposition has been made. Meanwhile, continued pressure is being exerted on Congress and the government to dispose of the furnace to best advantage of the national economy.

Legality Is Questioned — Final disposition appears to hinge on the legality of the lease made by War Assets Administration with Kaiser. This has to be approved by Attorney General Tom Clark, and the view is held in some circles there is a good chance the deal will be thrown out. Decision is expected within 30 days.

Under its agreement with Kaiser-Frazer, Republic will operate the $28 million furnace and coke plant, located at its Cleveland works, until May 1, 1949, and will continue to supply its customers with pig iron without interruption. Republic will receive all the pig iron produced by the stack except 5000 tons per month for which Kaiser-Frazer will pay Republic the full market price. No other products have been allocated to Kaiser by Republic, which company also retains all rights it has, or may have in the future, to continue its fight for permanent possession of the furnace and coke plant.

Kaiser Pays More — As result of the agreement, Kaiser-Frazer will pay the government about $100,000 more in rental of the furnace than it will receive from Republic. The latter company, Henry Kaiser said, will pay $1.40 per ton of pig iron and coke produced as rent for the furnace, while the Kaiser-Frazer rental to the government will come to $1.50 per ton.

However, the agreement, according to Mr. Kaiser, provides that Republic sell Kaiser-Frazer 5000 tons of pig iron monthly out of the furnace's expected monthly production of 38,000 tons. Since the Cleveland stack always has produced steelmaking iron, not foundry grades, it is assumed Kaiser-Frazer will use its monthly allotment of 5000 tons for conversion or trading for steel.

Will Build Facilities — During the period of operation by Republic it is

understood Kaiser will proceed to construct facilities required to operate the furnace independently of Republic's properties.

Meanwhile, Republic plans to press its request that the government nullify the contract between WAA and Kaiser, while the latter indicates it will insist on the validity of its deal with WAA.

Last week Kaiser-Frazer dispatched wires to most of its principal suppliers urging them to support the K-F position in the matter through letters and telegrams to congressmen and senators. At the same time, Charles M. White, president of Republic, attacked a statement attributed to WAA Administrator Jess Larson to the effect Republic will erect facilities for serving its customers by the time its agreement with Kaiser is terminated. For one thing, according to Mr. White, such facilities could not be installed within two years.

Others Press Protest — It is understood other bidders for the Cleveland furnace, such as Tucker Corp., Chicago, and the Wheland Co., Chattanooga, Tenn., plan to press their bids for approval. In the case of the Wheland company's offer, it appears this received little, if any consideration, by WAA, and this offer was said to involve more than $100,000 above the price at which the facilities were offered by WAA to Kaiser.

Few Surplus Plants Left

Only 52 out of total of 151 facilities in WAA's iron and steel inventory remain for disposal

RECENT airing of the contract between War Assets Administration and the Kaiser-Frazer Corp. whereby the latter company acquired control of the government-owned blast furnace at Cleveland operated by Republic Steel Corp., has intensified attention in remaining government owned properties which are up for disposal.

Most recent count shows the War Assets Administration lists 52 plants in its iron and steel inventory remaining to be sold. This is out of a total of 151 properties originally scheduled for disposal. Of the 52, most of them are small plants, and 30 of them have been taken over by their wartime operators on long-term leases and are in production. Of the remaining 22, most of them are idle, though several are being operated on interim leases.

While these remaining plants are classed as iron and steel facilities they also include forge shops, foundries, fluorspar mines, ferrosilicon plants, etc. As pointed out in STEEL (Aug. 9, p. 48), the most spectacular of the properties remaining are two blast furnaces, one at Cleveland and one at Gadsden, Ala., both operated by Republic Steel Corp.

WAA Plant May Produce Ingots

LAST week the War Assets Administration confirmed a report in the trade that several bids for the government-owned steel foundry at East Chicago, Ind., operated during the war by the Continental Foundry & Machine Co., were under consideration. However, it declined to give details since the matter was in negotiation. Indications were an announcement would be forthcoming in the near future.

Meanwhile, reports in the trade are to the effect three companies are bidding for the plant which has three 40-ton open hearths. Two of the prospective purchasers are reported to have offered $1,900,000 for the facilities, while the third party has offered $2 million.

To Produce Ingot—Trade gossip is to the effect that at least one of the prospective purchasers plans to produce conversion ingot in the plant if he is successful in obtaining the facility. It is said this bidder in recent weeks has approached prospective steel buyers, and also has been seeking to line up conversion rolling time with established steel mills.

This Continental plant has been up for sale for many months. On Jan. 24, 1947, WAA took bids on it and the sole bidder was the Continental company which offered $262,500 for the four buildings and $85,000 for the machinery and equipment. The bid was rejected. New bids were taken on Oct. 31, 1947. This time no bids were received for the real property, but Continental offered $109,019.95 for certain selected items of machinery, and Ohio Steel Foundry Co., Lima, O., bid $27,114.34 for some equipment. Both bids were rejected.

Enlarging Steel Facilities

PROGRESS by Jones & Laughlin Steel Corp., Pittsburgh, on its $12,700,000 improvement program on hot rolling facilities at its Otis Works in Cleveland, has enabled it to sell the old 30-in. hot strip mill at Otis Works to the Alan Wood Steel Co., Conshohocken, Pa. After Sept. 30 all steel produced at the Otis Works will be rolled on the 77-in. hot strip mill.

Alan Wood plans to use the proceeds of a bond offering for the purchase of the Otis mill at a cost of $1,200,000. In addition, it plans additional expenditure of $7,700,000 for reconditioning, shipping, and re-erecting the mill at Ivy Rock, Pa., and constructing related buildings and finishing and accessory equipment.

It is expected the mill will be ready for operation in 1949 and will have a capacity of 218,000 net tons annually. This will add substantially to Alan Wood's finished steel output.

Present capacity of Alan Wood's facilities for production of semifinished steel exceeds that of its finishing mills with the result a substantial portion of its output has been sold in semifinished form.

In July, the company commenced production of stainless clad steel with rated capacity at 15,000 tons on a yearly basis.

Youngstown Plans Pipe Mill

CONSTRUCTION of a new continuous butt weld pipe mill at Indiana Harbor, Ind., was authorized last week by directors of the Youngstown Sheet & Tube Co., Youngstown.

Following the directors' meeting, Frank Purnell, president, said the new mill will make up to 4½-in. outside diameter pipe. It will have a capacity of 120,000 to 150,000 tons per year, based on range of sizes produced.

"In order to prepare the raw materials, extensive changes will be made both in the blooming mill and in the 10-in. skelp mill," Mr. Purnell said. "It will also require doubling the capacity of the galvanized plant to manufacture galvanized pipe, and extensive improvements and enlargement of the present finishing floor."

Norton Dedicates New Plant

NORTON Co.'s new $4,300,000 plant for manufacture of grinding wheels under a new, speedy process was dedicated last week.

Described as the largest building in the world for production of grinding wheels, the plant covers approximately five acres. The building cost $1,800,000, and equipment, $2½ million.

Parallel manufacturing lines have been set up throughout the 602-ft length of the new plant. Abrasive grain and bond are brought into one end of the building and the various production steps take place in quick succession. A radically new feature of each production line is the continuous electric firing of grinding wheels in specially designed kilns.

Armed Forces Allocation Approved

Final steps now being taken by Office of Industry Co-operation toward placing into effect plan for making 102,505 tons of steel products available monthly for military needs

APPROVAL by Secretary of Commerce Charles Sawyer and Attorney General Tom Clark of a voluntary plan allocating steel products for requirements of the Armed Forces was announced last week by the Office of Industry Co-operation.

Request for compliance with provisions of the plan are being sent steel producers. This is the final step placing in effect the plan making available from steel producers 102,505 tons of steel products monthly to Armed Forces procurement agencies and to persons who need steel products to fill contracts for the Armed Forces. The plan applies to both prime contractors and subcontractors, provided the contracts involved have been assigned official Armed Forces contract numbers designating them as being entitled to benefits of the plan.

Defense Steel — Contractors and subcontractors placing orders with steel producers under the plan will specify the contract number or numbers involved and will certify that steel products received will be used only in filling requirements for those contracts.

Use of the plan by contractors and subcontractors is limited to steel to be actually incorporated in end products to be delivered to the Armed Forces.

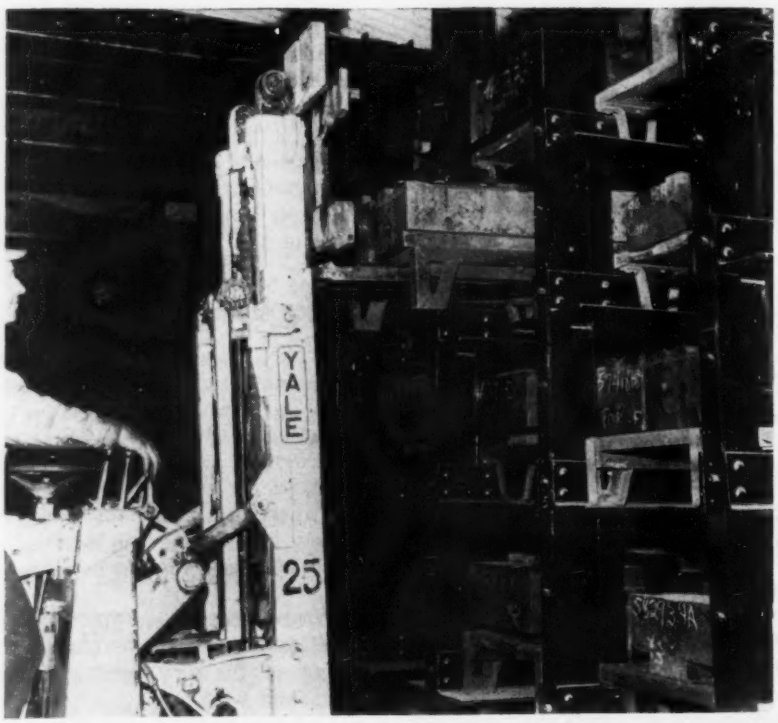
The voluntary plan was developed by the Office of Industry Co-operation, in conjunction with the Armed Forces and the steel industry, at the request of President Truman.

As a result of objections raised to a provision in the proposed plan which, in effect, required that steel products on hand, or under arrangements for delivery, be used to fill Armed Forces contracts before obtaining steel under the plan, this provision was eliminated.

Prefabricators To Get Steel

VOLUNTARY allocation plan providing a maximum of 59,000 tons of steel sheet and strip, other than enameling grades, to manufacturers of factory-built steel houses has been approved by Attorney General Clark.

Under the plan six manufacturers of prefabricated housing will be provided with "sufficient steel to give adequate demonstration of the utility and practicability of each particular type of house, and to determine whether or not this type of home furnishes an answer to the demand for low-cost housing."



SPACE SAVER: High racks and a fork truck permit maximum use of space in a new die storage building at International Harvester Co.'s works at Ft. Wayne, Ind. Dies are stored five high, each die on its own skid. Any die can be moved independently of the others

Mine Steel Allocation Proposed

APPOINTMENT of an industry advisory committee to consider the practicability of a voluntary plan to provide steel products for bituminous coal mine operation, maintenance and repair was recommended by bituminous coal mine operators at a meeting with officials of the Office of Industry Co-operation.

The mine operators, representing some 7500 individual concerns, were told any proposed voluntary allocation plan must contain adequate provisions to take care of steel requirements of the small mines, as well as medium and large operators, and that because steel supplies are becoming tight, any proposed steel allocation would require very careful screening by OIC before being submitted to the Steel Advisory Committees.

Officials of the Interior Department recommended a plan to provide steel for production of coal and for essential maintenance and repairs. Based on an anticipated annual output of 620 million tons of bituminous coal, steel requirements are estimated at 373 200 tons yearly.

Appoints Industry Committees

RAIN-Carrying Equipment Industry Advisory Committee and a Task Committee have been appointed to consult with the Office of Industry Co-operation in connection with steel requirements for the industry under the voluntary agreements program.

Virden Resigns OIC Post

JOHN C. VIRDEN resigned last week as director of the Office of Industry Co-operation to return to the chairmanship of the John C. Virden Co., Cleveland, lighting fixture manufacturer. Several months ago Mr. Virden attempted to resign but stayed on at the request of Commerce Secretary Charles Sawyer and President Truman.

Appointed as acting director of OIC is Earl W. Clark, former Office of Price Administration official and Illinois state employment director.

Assures Iron Ore Reserves

Group of steelmakers buys interest in Butler Bros., large Lake Superior iron mine operator

SIGNIFICANT move was made last week by a group of independent steelmakers to assure continuance of substantial ore reserves in the Lake Superior District by acquiring a substantial interest in Butler Bros., large iron ore operators on the Mesabi Range in Minnesota.

The purchasing group was made up of Armco Steel Corp., Middletown, O., Inland Steel Co., Chicago, Wheeling Steel Corp., Wheeling, W. Va., and Hanna Coal & Ore Corp., subsidiary of the M. A. Hanna Co., Cleveland.

Butler Bros. name will be retained, as will present operating personnel, but the Hanna interests will assume supervision and management of the operations, as agent, for the interested parties.

Operates Five Groups of Mines—Butler Bros. this year are operating five groups of mines on the Mesabi Range, shipping approximately 3 million tons, and they have large undeveloped ore reserves on the Mesabi and Cuyuna Ranges in Minnesota.

In addition to the Butler properties, undeveloped properties owned by Hanna Coal & Ore Corp. will be included in the new arrangement.

Subject to fulfillment of the outstanding ore contracts of Butler Bros., this tonnage will be available for use by the steel companies participating in the purchase and will constitute a substantial addition to their raw material reserves.

Long Established Company—Butler Bros. is one of the conspicuously successful companies in the iron ore business. It grew out of a contracting business founded in 1894 by five brothers. The contracting firm enjoyed a large volume of business, constructing office buildings, hospitals, colleges, ore docks, breakwaters, tunnels and government buildings, including the Minnesota and North Dakota state capitols, the Detroit-Windsor railroad tunnel and the Federal Building in St. Paul.

Shortly after 1900 the brothers began to secure contracts to develop iron ore properties on the Mesabi and Gogebic Ranges. They subsequently acquired ore properties of their own, and in 1914, their first year of production, shipped 206,000 tons of ore. Since then they have shipped about 60 million tons from the Lake Superior District. By 1920 the organization was devoting all of its efforts to the iron ore business.

U.S. Steel Buys German Scrap

GERMAN scrap has been purchased by Carnegie-Illinois Steel Corp., U. S. Steel subsidiary, and is being loaded for shipment to the United States, it has just been announced by the company. It consists of a substantial tonnage of prepared carbon steel material.

Purchase of the scrap has had formal approval of the German Joint Export & Import Agency. Loading for shipment has started and most of the tonnage will be delivered by the end of the year, with completion of the total movement by April of next year.

Reports on German Scrap

IMMEDIATE steps must be taken to remove present obstacles in the way of establishing an effective plan of action by American interests if the United States is to obtain more scrap steel from Germany, Robert W. Wolcott declared last week in a report covering his recent trip to Germany at the request of Commerce Secretary Sawyer.

He is president of Lukens Steel Co., Coatesville, Pa., and is chairman of the Committee on Iron & Steel Scrap, American Iron & Steel Institute, and the Steel, Foundry & Scrap Industries' Committee for Expediting Iron & Steel Scrap.

Establishment of a single scrap purchasing and selling organization to act in co-operation with the British as to all scrap to be exported from Germany was recommended by Mr. Wolcott. He stated scrap needs of the sixteen nations which will be given aid by the United States should be recognized in order that they might maintain essential steel production.

Pig Iron Output Declines

PRODUCTION of pig iron, ferromanganese and spiegeleisen declined 90,572 tons during July to a total of 4,899,929 tons, according to the American Iron & Steel Institute. This brought the total for the first seven months to 33,861,473 tons compared with 34,070,417 tons for the like period a year ago. Blast furnaces were operated at 85.9 per cent of capacity in July compared with 90.2 per cent in June and 85.2 per cent for the first seven months.

Production of pig iron alone totaled 4,840,280 tons in July, distributed by districts as follows: Pittsburgh-Youngstown, 1,874,552 tons; Chicago, 969,009 tons; eastern, 944,052 tons; Cleveland-Detroit, 481,632 tons; southern, 374,427 tons; and western, 196,608 tons.

Total steel ingot production, amounting to 7,069,710 net tons in July, included 681,543 tons of alloy steel compared with 685,449 tons in June, and 882,279 tons of hot-topped carbon ingots against 914,082 tons in June.

Distribution figures by districts were the following: Pittsburgh-Youngstown, 2,798,175 tons; Chicago, 1,502,701 tons; eastern, 1,409,943 tons; Cleveland-Detroit, 584,387 tons; western, 410,244 tons; and southern, 364,260 tons.

PIG IRON AND FERROALLOY PRODUCTION FOR JULY AND YEAR TO DATE

Blast Furnace Capacity and Production—Net Tons — JULY - 1948

	Number of companies	Annual blast furnace capacity	Production							
			Pig Iron		Ferro Manganese and Spiegel		Total		Percent of capacity	
			Current month	Year to date	Current Month	Year to date	Current month	Year to date	Current month	Year to date
Distribution by Districts:										
Eastern	11	13,093,560	944,052	6,175,163	33,256	197,225	977,308	6,372,388	88.3	83.6
Pittsburgh-Youngstown	17	25,588,120	1,874,552	13,123,570	13,303	149,889	1,887,855	13,273,459	87.3	89.1
Cleveland-Detroit	6	6,495,000	481,632	3,377,993	-	-	481,632	3,377,993	87.7	89.4
Chicago	7	14,700,290	969,009	6,921,313	5,094	10,190	974,103	6,931,503	78.4	81.0
Southern	8	4,949,660	374,427	2,533,442	7,996	56,102	382,423	2,589,544	91.4	89.9
Western	3	2,612,300	196,608	1,316,586	-	-	196,608	1,316,586	89.0	86.6
Total	35	67,438,930	4,840,280	33,448,067	59,649	413,406	4,899,929	33,861,473	85.9	85.2

Basing Point Data Sought

Senate Trade Policies Committee asks views of industry and labor on freight absorption, etc.

MASS of information and data are being assembled by the Senate Trade Policies Committee bearing on its forthcoming inquiry into freight absorption and delivered pricing problems of industry resulting from recent decisions of the United States Supreme Court and rulings of the Federal Trade Commission barring use of basing point, zone and similar systems of pricing.

Sen. Homer E. Capehart (Rep., Ind.) last week asked trade associations, chambers of commerce, labor organizations and companies to assist the committee in its study of the problem by making known their views on the subject. Committee hearings are scheduled to start on or about Nov. 15.

Receive Heavy Mail—To date the committee has been in receipt of a heavy mail. Letters have been received from every section of the nation, from representative companies and spokesmen for many industries. In fact, Senator Capehart states the majority of letters received are concerned with the problems of industries other than cement, which industry was directly concerned in the decision of the Supreme Court outlawing use of basing point pricing.

Most of the communications are critical of the Supreme Court's decision. As a matter of fact, only one letter favoring the decision has reached the committee and only two requests to testify in favor of the ruling have been received. While only one letter has been received from a labor organization, the United Cement, Lime & Gypsum Workers International Union (AFL), it is expected other labor unions will make known their views on the subject before the hearing starts.

Sees Ghost Towns—In his letter to the committee, William Schoenberg, president of the cement workers union, criticized the cement decision, asserting it might lead to creating "small ghost towns" in communities from which cement plants have been forced to move.

Other typical letters to the committee: A Massachusetts paper manufacturer says f.o.b. pricing lends to centralization rather than decentralization of industry.

A Texas lumber company says the Supreme Court ruling is inflationary; that the consumer will have to pay any increase in price caused by the ruling.

GE BAKING OVEN: New test oven, combining advantages of infrared and convection heating, has been completed at GE's Schenectady plant. A technician is shown timing the progress of a painted cover as it twirls on conveyor between banks of lamps

Many letters from companies in the home construction field predict higher costs, distributors of plumbing and building materials being forced to pay higher prices on virtually everything they buy.

Manufacturer of water well supplies writes many small enterprises cannot exist or sustain operations at present locations on local volume, and by necessity will be forced to relocate or liquidate their plants.

Other letters are in the same vein. One fear running through many of them is that numerous areas will run short of supplies.

On the other hand, a Chicago steel fabricator writes that with the outlawing of the basing point system, steel suppliers outside the Chicago area now can ship into the area without being penalized by having to absorb freight.

Switch to Trucks Limited

ANTICIPATED shift by the metalworking industry from rail freight rates to cheaper truck transportation has not yet materialized to bear out predictions that a transportation upheaval would result from the double blow dealt by the change to mill pricing in steel and higher rail freight rates.

Only in scattered instances have steel company traffic departments received shipping instruction to change from rail to truck. Carrier firms have been getting an unusual number of inquiries about their rates, but little business thus far.

This actually isn't surprising, according to truckers. Carriers are doing a record business now and are not particularly pushing for new. Furthermore, open trailers are the best for steel hauling, and not all companies are thus equipped for handling steel. Although most steel producers and consumers have facilities for truck shipments, few at the present time are able to handle any in greater volume.

Captive Truck Lines—Many steel producers—Sharon Steel Corp., for example—have their own truck lines, but no expansion in routes or equipment is contemplated. Sharon has owned for many years a fleet of 20 diesels used principally for hauling materials between various Sharon plants, but, as with the case of most independent lines, no enlarged customer service is planned for the present.

Many carriers are holding up on campaigns to get more steel hauling business because they believe it possible that legislation legalizing the old basing point system may come out of the next Congress.

Gradual Increase—If the mill pricing situation appears permanent, truckers anticipate a gradual increase in their share of the metal shipping business. Truck rates are going up—in the Central States, for example, tariffs on iron and steel products jumped an average of about 10 per cent effective Sept. 1—as well as rail costs, but the comparable truck-rail quotations still favor the former, as indicated by table on page 67 which lists average rates between various representative points. Some lower truck rates than these are in effect, chiefly with contract haulers or un-

der special competitive conditions, but these figures are typical.

(cents per 100 lbs. for carlot)

From	To Detroit truck	To Detroit rail	To Chicago truck	To Chicago rail	To Cleveland truck	To Cleveland rail
Cleveland ..	26	35.02	43	49.44	..	....
Youngstown .	33	40.17	47	54.59	13	20.8
Pittsburgh ..	40	47.38	53	58.71	26	30.9
Canton, O. .	30	37.08	44	50.47	13	16.48
Portsmouth, O.	41	48.41	47	54.59	35	45.32

Ask Rate Raise on Coal, Ore

INCREASE of 10 per cent in freight rates on coal, coke and iron ore is being sought by the railroads. The request was made Aug. 27 to the Interstate Commerce Commission, and the Association of American Railroads said that, if granted, the increase would raise average rates on anthracite and bituminous coal and coke throughout the country by 25 cents a net ton, or 28 cents per gross ton, and on iron ore by 20 cents per net or gross ton in the East and South.

Since 1939, rates on bituminous and anthracite coal have advanced about 27 per cent, on coke 25 per cent, and on iron ore about 20 per cent. Rates on all commodities, including coal, coke and ore, have risen an average of 44 per cent.

In its request for the increase the carriers maintain it is necessary to offset rising operating costs. They state a substantial part of their cost increases is due to the rise in the cost of railway materials and supplies, directly attributable to increases in the prices of coal, iron and steel.

Seek To Reduce Freight Losses

PORCELAIN enamelers are making a drive to reduce freight losses and rates through a packaging and shipping standardization program which has been launched nationally under sponsorship of the Porcelain Enamel Institute.

First step is creation of a Packaging & Shipping Committee which will co-ordinate the industry's efforts with groups representing the carriers, producers of packages and containers, appliance associations, etc. R. F. Bisbee, manager, Quality Control, Westinghouse Electric Appliance Division, Mansfield, O., is general chairman.

Formulation of a standard pretransportation test procedure to assure that products and packages will withstand normal transportation hazards without damage is the aim of the committee. Suitable test equipment and testing specifications must be developed in order to standardize procedure.

A Technical Planning Division headed by E. H. Shands, George D. Roper Corp., will meet with the carriers and accept proposals for suitable testing standards. This division will then undertake the study of test equipment.

Equipment to be considered includes an incline impact testing device, a vibration test apparatus and a combination vertical and horizontal shock recording instrument.

Purchasers Grow Cautious

NAPA survey indicates some slowing down in activity. Buying held to 30-60 days

PURCHASING agents report general industrial business has maintained the gains made from March to June, but has leveled off on that high plateau and show signs of a downward trend, according to the Business Survey Committee of the National Association of Purchasing Agents.

Production is slightly off from June, largely reflecting vacation shutdowns. Backlog of orders has shown no increase since June.

More business is adversely affected than helped by the switch to fob shipping point pricing, in the opinion of purchasers.

Price Upswing Sharp—Discussing prices the committee's August report states that the sharp upswing which followed the summer wave of wage increases, covered more materials and had effect on more business than in any period since price decontrol. However a substantial number of declines were made.

The current trend, the purchasers report, is toward caution in the accumulation of inventories. Buying trend has definitely changed to 30-60 day commitments compared to previous 90-day commitments, the committee reports.

Western Jobbers Adjust Prices

AT LEAST two major Los Angeles warehouses are segregating Kaiser steel from that purchased elsewhere. Other jobbers are adjusting policies in an effort to compensate for the unusual situation brought about by the recent price increase on steel produced at Kaiser's Fontana plant.

At the same time a few warehouses have announced that no change in pricing methods is being contemplated now.

Two principal marketing plans in effect include one that adds, for instance, $1.50 on all Kaiser plate, and another that boosts all prices by an average of $1.30 across the board. Under this latter method, steel from mills other than Fontana is being sold at a higher level so as to force it to an average laid down by the Kaiser advance.

Form New U.S. Steel Subsidiary

UNITED STATES Steel Corp, has a new subsidiary, Consolidated Western Steel Corp., a Delaware corporation.

The new subsidiary came into existence to take over on Sept. 1 the business and operating properties of Consolidated Western Steel Corp., a California corporation, including the plants formerly operated by Western Pipe & Steel Co. of California and the Steel Tank & Pipe Co. of California.

Provides for Equipment Export

ECONOMIC Co-Operation Administration has announced policy and procedure for administering section 204 of the ECA Appropriations Act relating to placing with participating countries commodities for which export licenses have been denied by, or cannot be obtained from, the Commerce Department.

Section 204 provides that whenever an export license has been denied or cannot be obtained for a commodity which was to be shipped to a nonparticipating country, under a contract entered into in good faith prior to Mar. 1, 1948, the ECA administrator shall provide for procurement of such commodity to transfer to a participating country in accordance with the requirements of such country, at not less than the contract price, including any cost incurred in converting the commodity.

To assure greatest possible quantity of these commodities is transferred to participating countries, an agreement has been concluded between ECA and the Commerce Department, whereby the latter will hold up action for 30 days after appeal. During this period ECA will seek to place the goods with a participating country.

Machine Tool Sales Slower

MACHINE tool sales for the second half of 1948 got off to a slow start with the National Machine Tool Builders' Association sales index for July at 74.5 per cent of the 1945-1947 average, compared with 83.4 per cent in June.

The association's index of shipments in June, which is an average of shipments for April, May and June, also declined to 79.9 per cent, from 86.3 per cent recorded the preceding month.

Windows of Washington

By E. C. KREUTZBERG — *Washington Editor, STEEL*

Procurement problems of small business, especially with respect to metallics, command increasing attention in Washington. Consumers seek government aid

GROWING awareness in Congress and official Washington in general of the acute procurement problems of small business, especially as regards metallics, was emphasized recently by two events of more than ordinary significance.

One was the joint hearing of Senate and House committees into the lease by War Assets Administration of a government-owned blast furnace and coke plant at Cleveland to the Kaiser-Frazer interests. The second was a conference on small business by the Department of Justice which was participated in, among others, by that perennial advocate of small business, Senator James E. Murray (Dem., Mont.).

In both instances the procurement difficulties of small manufacturers were highlighted for attention.

Implications Uncertain—Just what implications are to be deduced from this apparent intensification of government interest in small business' problems is difficult to say. It is evident, however, that the complaints of small businessmen are getting a prompt hearing these days, possibly forecasting something in the way of remedial action, or at least promises of such, in the months ahead.

Of course, the solicitude of Congress, and the administration for that matter, for small business is perfectly understandable in an election year. Every candidate for office will tell you his heart bleeds for the small man. This, nevertheless, does not discount the fact that small business today is being hearkened to with a degree of sincerity that tempers to considerable extent the aspect of plain lip service.

Looking To Washington—The question naturally arises as to whether small business is becoming more vociferous in its complaints, looking to the government for relief in solving its problems, and especially raw materials procurement. No one can answer that with any definiteness. Some one is always complaining to Congress and the government, but whether more complaints are being received now is impossible to say. The suspicion is growing, however, that the desperate position of many small companies in the matter of raw materials procurement is tempting them to look to Washington as their chief hope for relief.

Whether the signs indicate small business is coming around to the point of view mandatory allocation of iron and steel and other critical materials in short supply is desirable is debatable. The evidence doesn't seem to support this idea at all. In almost every instance small business men testifying before congressional committees emphasize they don't want mandatory allocations, or government controls of any kind. Nevertheless, it is not clear just what they expect the government can do to aid them, so that the very fact Washington officialdom is asked from time to time to help the small man when something goes haywire, naturally lends comfort to the proponents of more active participation of government in distribution of scarce commodities, such as steel.

Mandatory Allocation Unlikely — At the moment there seems slight chance allocation of steel and other commodities will go beyond the voluntary plan set up under public law 395. This program is limited in scope, and to date at least, confines procurement assistance to a few economic groups.

In only a minor way is this program comparable with wartime allocation by the government. The fact does not seem to be clear to many small businessmen that the voluntary allocation program is not set to care for ordinary hardship cases. Furthermore, public law 395 under which allocations are authorized, is scheduled to expire Feb. 28 unless extended.

There is some question whether this law will be continued by the 81st Congress, though most observers of the Washington scene seem to think it will be. The National Security Resources Board only a week or so ago recommended to President Truman that voluntary allocation of petroleum and steel be continued. This board, it was said, also urged use of mandatory authority in event voluntary agreements proved ineffective. However, it was understood, the board feels mandatory allocation is unnecessary at this time insofar as national defense requirements are concerned since the very existence of such government authority, which is vested in the President by the Selective Service Act, is sufficient to give force to voluntary action. This, of course, does not apply to private industry producing for the peacetime market.

On Their Own — Consequently, the separate manufacturers not included in any of the favored voluntary allocation groups, are on their own so far as supply procurement is concerned. It is understandable, therefore, that with the continuing shortage of steel and other critical materials, manufacturers, finding a solution of their procurement problems out of their own reach, might be tempted to turn to Washington for relief. Certainly, it will not be surprising if they do so when the impact of voluntary allocations on overall supply of steel begins to be felt with increasing force. That probably will be in the fourth quarter of this year.

Protest Threat to Iron Supply

AT THE recent joint hearing by the Senate Small Business Committee and the House Procurement & Building Subcommittee into the lease of the government-owned blast furnace at Cleveland to the Kaiser-Frazer interests, representatives of small manufacturing and foundry groups in New England, the East and Midwest testified to the urgency for solving the question of their iron supply which seemed threatened by pending transfer of the furnace from control of Republic Steel Corp.

In every case where a spokesman for the foundries testified, it was emphasized that concern of the foundrymen was not over who operated the plant, but rather whether they would be assured a continuing supply of pig iron in event the furnace transfer was consummated. All seemed to think they would be better served were the furnace to remain with Republic with whom they had been doing business for many years, and with whom they had historical standing as buyers. Transfer of the plant to Kaiser, they feared, would upset this historical distribution pattern to the extent some of them would have to close down entirely, others partially, with resulting widespread unemployment and economic distress in small communities throughout the affected areas.

Numerous Protests — The extent of this concern was exhibited in the piles of telegrams and letters to con-

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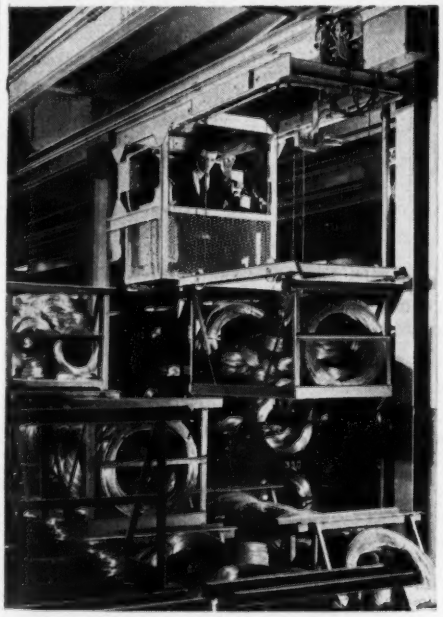

Operator of MonoTractor Carrier can deposit or select racks of wire at any spot in the warehouse.

A recently installed American MonoRail Overhead Handling System at the Wire Rope Division of Jones & Laughlin Steel Corporation not only saves time and labor, but also increases safety and improves quality of production.

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gressmen and senators protesting consummation of the deal by the War Assets Administration. As a matter of fact, the flood of letters, telegrams and telephone calls directed to Congress was largely the force which motivated Senator Kenneth S. Wherry (R., Nebr.) and Congressman George H. Bender (R., Ohio) to call the hearing. And it was significant that throughout the hearing Senator Wherry emphasized over and over again that his concern, and that of the committee, was not who gets the Cleveland furnace but rather that the pig iron customers of Republic continue to receive metal in event Kaiser takes over the plant.

The pleas of small foundrymen to Congress to do something for their protection in the Republic-Kaiser furnace deal, of course, are exceptional in that they resulted from a sudden threat to the pig iron distribution pattern, a threat which the foundrymen themselves were helpless to remove. Nevertheless, the speed with which these small business men hastened to place their case before the government would seem to support the view that if supply conditions get tighter than they now are, there likely will be less and less reluctance on the part of small business to look to the government for aid.

Hold Small Business Conference

WITH respect to the conference on small business by the Justice Department, it appears manufacturers have been complaining increasingly about the difficulties they confront in doing business.

In a statement at the opening of the conference, Assistant Attorney General Herbert A. Bergson, in charge of the Anti-Trust Division, pointed out that the acute shortages of both raw materials and manufactured products have rendered the successful conduct of small business more difficult.

Continuing Trend — "Unfortunately," he said, "the continuing trend toward economic concentration threatens the very existence of large segments of the small independent enterprises of the country. The threat to small business is also evidenced most forcibly by shortages of raw materials, particularly in those industries in which large manufacturers have integrated operations by the acquisition of sources of raw materials and by the elimination of independent distribution outlets.

"During the last two years the greater percentage of complaints received by the Small Business Unit have been in the field of supply. Accordingly, our work has been devoted largely to obtaining recognition for new small businesses without past purchasing records, and the reinstatement of small concerns upon the customer lists of the larger companies.

CAPITOL CLEAN-UP: Following the recent extra session of the 80th Congress, workmen take advantage of the recess to prepare the capitol for the next Congress which will convene in January. NEA photo

Work Difficult — "This work has been made difficult because of the general use of the historical record of purchases as the basis for the allocation to customers of items in short supply. This method of customer selection has operated to the great disadvantage of small concerns, and particularly veterans seeking to establish themselves in new businesses."

While Secretary Bergson didn't say so, one would be justified in assuming from this quotation that distribution based on historical record of purchases may come under attack in the months to come. If so, then the pattern followed generally in the steel industry since the end of the war will be in danger of passing out. Should its quota plan, based on historical position of buyers with suppliers, be eliminated in one way or another, there seems little question confusion and inconvenience in supply may be intensified to the point strict government allocation of available materials would be welcomed on a much greater scale than now seems possible.

Metallics Supply Study Seen

THERE SEEMS little doubt that the whole question of metallics supply will come in for considerable study by the next Congress in event conditions do not improve. That the situation is desperate for many manufacturers is obvious. One could not sit in at the hearing of the Republic-Kaiser-Tucker rhubarb over the Cleveland blast furnace without realizing the seriousness of the plight of small manufacturers contending for supplies available in quantities considerably below apparent requirements.

As a matter of fact, the Cleveland furnace argument stems directly from the metallics shortage. Kaiser, a newcomer in the automotive industry, needs iron and steel to build cars. Lacking historical buying record with the steel companies, he has had the devil's own time acquiring supplies, and in seeking to solve his problem he has gone out and acquired his own iron and steelmaking facilities. Other manufacturers have done likewise, and still other new entrepreneurs like Tucker would do the same if they knew where facilities were available.

Supplies Cut Off — In some cases such acquisition of iron and steelmaking facilities has cut off supplies of metallics available to the open market. In the case of the Cleveland furnace, which Republic had operated and in doing so had been able to make the iron output from two other stacks available to the merchant trade, foundrymen felt compelled to protest the lease or sale to Kaiser, fearing this important supply source would be cut off, leaving them high and dry with no place to turn.

Wrong Road for ERP?

Germans think so and charge that some use Marshall Aid to squeeze Ruhr industry

GRUMBLING and protests from German business are becoming louder regarding the route the European Relief Program appears in danger of taking if it follows the road signs being erected by other western European nations.

German industry regards as particularly alarming the recent recommendations from economic experts meeting in Paris who have come up with plans for subsidizing and otherwise sheltering high cost industries so as to reduce imports and thus save precious dollars. The money for this subsidizing would come from proceeds of Marshall Plan loans. The French in particular argue that such a course is necessary since French overseas investments have largely evaporated and development of domestic industry hitherto more or less dormant is the only way out.

Ignores ERP Spirit—The entire spirit of the Marshall Plan would be circumvented should such a course be followed, according to German business men. Instead of creating the envisioned unified Europe through revived trade between nations, the American program would merely help to build even higher the age-old trade walls between nations which in the past have served so well in fostering European sectionalism.

Germans see the proposed subsidization of uneconomic industry as another flanking movement in an attempt to throttle German exports which are essential for revival in western Germany. The minimum German steel production per year is generally set at 10.7 million tons.

Efficiency Rising—Charges by other western European nations that Germany can't begin to produce even this tonnage have been denied by Reich steelmen. The French have pointed out that German coal miners now mine only 1300 kilograms of coal per eight-hour day, compared with 2000 prewar. The Germans counter with the rising Ruhr steel output figures to show that their nation deserves a place in the European economy. About 50,000 tons of rolled steel will soon be shipped to Sweden, the largest order of this kind since the war's end. Management is also shaping up. With the exception of Krupp directors and a few other steel industrialists who were out-and-out Nazis, most prewar steelmen have drifted back to important jobs. One ironic touch is that the Socialists, who wish to nationalize the Ruhr and who also claim to be strong anti-Nazis, have hired several bigwigs of the old Speer production ministry of Nazi days as their advisers in plans to socialize industry. Complete socialization, however, appears a long way off.

A rumor in reliable circles, incidentally, is that still other Speer people have been hired by the United States Army to build underground factories.

Ruhr officials see as another impetus to greater efficiency and production the pending increase in steel prices by $5.40 per ton. This boost hasn't materialized yet, but most steelmen are reasonably certain the grant will come sometime this month. Prices of all other European steels are also on the rise.

U. S. Exports of Steel Decline

UNITED STATES exports of iron and steel are steadily declining in spite of predictions from some quarters that ERP commitments would skyrocket ferrous exports to dangerous heights.

Average monthly exports during 1947 total 549,274 net tons. In the first three months of this year iron and steel exports averaged 459,144 tons, a drop of almost 100,000 tons. The decline has continued, with May, 1948, exports totaling 346,453 tons and those for June 341,730 tons. Some of the most spectacular declines have occurred in ingots, blooms, billets, slabs, sheet bars, wire rods, skelp, iron bars, concrete bars and alloy steel bars, with export shipments running thus far this year at only 50 to 65 per cent of shipments last year.

A few products, on the other hand, are being shipped in heavier quantities thus far this year than last. Included among these are tin plate and tagger's tin, seamless black pipe and bolts, nuts and rivets.

In 1947 shipments were heaviest for structural shapes, followed by tin plate and tagger's tin. During the first half of this year these positions have been reversed, with tin plate and tagger's tin in first place, followed by structural shapes.

U. S. IRON AND STEEL EXPORTS—SIX MONTHS, 1948

(Net Tons)

	June 1948	First Six Months—1948	Year—1947
Semi-Finished and Finished Products:			
Ingots, blooms, billets, slabs, sheet bars	14,188	137,525	490,765
Wire rods	2,260	23,503	71,237
Skelp	5,728	29,829	67,403
Iron bars	384	2,897	34,755
Concrete reinforcement bars	9,919	70,525	248,205
Steel bars, cold finished	3,190	24,906	106,301
Other steel bars (excluding alloy)	21,262	178,197	535,421
Alloy steel bars	4,821	38,345	207,999
Welding rods, electric	1,159	8,843	14,844
Boiler plate	2,159	20,300	32,560
Other plates, not fab.	22,684	183,683	530,265
Plates, fab., punched or shaped	4,283	14,303	37,231
Iron sheets, black	1,558	9,723	30,216
Steel sheets, black	31,678	225,931	568,867
Galvanized sheets	6,280	29,744	74,603
Strip steel, cold rolled	4,051	29,702	89,621
Strip steel, hot rolled	4,144	39,049	106,850
Tin plate and tagger's tin	41,323	323,268	609,509
Terne plate (incl. long ternes)	936	5,168	12,851
Structural shapes, plain	27,897	165,819	754,182
Structural shapes, fab.	18,050	96,279	
Frames and sashes	241	1,605	42,830
Sheet piling	1,979	23,040	
Rails, 60 lbs. per yard and over	21,111	157,209	
Rails, less than 60 lbs. per yard	1,745	5,654	500,584
Rails, relaying	7,128	18,254	
Splice bars and tie plates	1,990	34,546	
Frogs and switches	222	3,446	157,820
Railroad spikes	610	5,770	
Railroad bolts, nuts, and washers	806	4,752	
Car wheels, tires and axles	4,581	20,932	88,646
Seamless black pipe	1,378	10,134	18,723
Seamless casing and oil line pipe	24,123	120,464	333,498
Seamless boiler tubes	3,488	20,801	69,955
Welded black pipe	4,944	32,466	91,133
Welded galvanized pipe	3,457	22,061	70,221
Welded casing and oil line pipe	3,127	90,152	*
Welded boiler tubes	195	947	*
Other pipe and fittings	3,710	35,104	101,853
Plain wire	5,338	39,186	84,382
Galvanized wire	4,344	26,938	101,026
Barbed wire	2,287	21,668	78,864
Woven wire fencing	424	5,571	12,378
Woven wire screen cloth	526	2,869	5,986
Wire rope and strand	1,049	6,783	30,785
Wire nails	1,671	10,046	25,755
Other wire and manufactures	4,691	24,545	52,068
Horseshoe nails	13	354	
Tacks	295	2,073	15,995
Other nails, incl. staples	1,261	6,365	
Bolts, nuts, rivets and washers, except railroad	5,159	31,570	48,325
Forgings	1,872	14,303	35,870
Horseshoes	11	261	900
TOTAL	341,730	2,457,408	6,591,282

Source: United States Department of Commerce.

Stockpiling Speeded Up

Munitions Board accelerating purchase of 67 materials. Delivery of $213 million worth seen

WHILE the national critical materials stockpiling program is being speeded up, it was reported last week that some strategic materials are not being stored because of storage problems.

The Munitions Board, however, is accelerating purchase of 67 materials, ranging all the way from agar and antimony to zinc and zircon. These materials are being brought into the country from all parts of the world. The Economic Co-operation Administration is helping to obtain some of the materials.

Expectations are the Munitions Board by next June will have spent or become obligated for about $490 million in the stockpiling program. Materials valued at $300 million will have been delivered by that time, of which $213 million worth will be delivered in fiscal 1949. Only $87 million worth of materials were delivered for the program up to June 30, 1948.

Actually, it is said, one-fourth of the materials planned for the national stockpile have been purchased, and purchasing of the remainder in the face of rising commodity prices may necessitate enlarging the overall total of $3,403,000,000 originally erected as the program's goal.

Accelerated Accumulation — While the Munitions Board states it has sought to achieve maximum rate of stockpile procurement with minimum withdrawal of scarce materials needed by private industry, national security now requires accelerated stockpiling.

Board's policy of accelerated accumulation now calls for more rapid transfer of materials to stockpile from government agencies; urging voluntary allocations of needed materials by industry in co-operation with the Commerce Department; stepping up purchase procedures to the limit without provoking inflation or threatening serious injury to the national economy; accepting long-term contracts for the entire output of a new development until stockpile needs of the particular material are satisfied.

Physically the bulk of the stockpile is stored throughout the country at 70 different military depots, 10 private facilities, and 3 standby defense plants. In two cases low grade ores are stored on public lands. In addition, a storage plan for each individual item in the stockpile was prepared by a Stockpile Storage Committee representing the Army, the Navy, the Air Force, Treasury, Agriculture and Interior.

The Bureau of Federal Supply maintains full records of the status and condition of stockpiled materials, and implements systematic plans for rotation of perishable stores. Procedure for release or use of material in the stockpile precludes any form of dumping or price influence. Items found no longer critical may be sold only after six months' public notice, and after a full description of the disposal plan has been submitted to Congress.

Stockpiling Goals Listed

TWENTY-EIGHT major materials are included in the proposed third quarter stockpiling procurement program of the Munitions Board. Among the items are bauxite, chromite, copper, industrial diamonds, lead, manganese ore, nickel, tin, zinc and other materials.

The purchase program for the July 1 to Oct. 1 period calls for delivery before June 30, 1949, and includes contracts which in some cases have already been signed. Not included are the long-range programs intended primarily for stockpile materials and for which deliveries cannot be expected until some time after June 30, 1949.

In announcing the goals the board pointed out that industry aid is essential to success of the program. The fourth quarter procurement announcement, it was said, in part will serve as a guide to industry groups in studying the nation's requirements for critical and strategic materials necessary in an emergency.

It was also pointed out by the board that release of the stockpile purchase goals demonstrates the relatively minor impact that operation of the government's stockpile has on the national economy. It was emphasized that objectives have been established in the light of current supply conditions in order to minimize

SCRAP MINE: Scrap scarcity has turned old dumps into gold mines. One operator, Ike Sunshine, recently salvaged 12,500 tons of iron scrap from one waste area in Chattanooga, Tenn., by scooping up the waste, carrying it to processing equipment where magnetic separators extract the iron

effects of the program on prices.

Current purchase objectives follow:

Material	Amount to be Contracted for During July-September 1948 for Delivery Before 30 June 1949
ASBESTOS	
Chrysotile	1,100 short tons
Amosite	1,900 short tons
BAUXITE	
Metal Grade	435,000 long dry tons *
Abrasive Grade	68,000 long dry tons *
BERYL	250 short tons
BISMUTH	100,000 lb
CADMIUM	300,000 lb
CASTOR OIL	15,000,000 lb *
CHROMITE	
Metallurgical	30,000 long dry tons *
Refr. Type A	1,250 long dry tons
COCONUT OIL	5,000,000 lb
COLUMBITE	1,100,000 lb *
COPPER	30,000 short tons †
CORDAGE FIBERS	
Manila	6,000,000 lb
Sisal	6,000,000 lb
CORUNDUM	125,000 lb
DIAMONDS, INDUSTRIAL	
Stones	350,000 carats *
Crushing Bort	100,000 carats †
GRAPHITE	
Amorphous Lump	1,000 short tons *
Flake (Crucible)	300 short tons
Flake (Lubricant)	500 short tons *
KYANITE	1,000 short dry tons
LEAD	16,000 short dry tons
MANGANESE ORE	
Battery	20,000 long dry tons *
Metallurgical	350,000 long dry tons *
MICA	
Muscovite Block	80,000 lb *
Muscovite Film	125,000 lb *
Muscovite Splittings	1,000,000 lb *
Phlogopite-Splittings	120,000 lb *
MONAZITE	500 short dry tons *
NICKEL	15,000,000 lb *
PALM Oil	7,000,000 lb
PEPPER	1,000,000 lb
QUINIDINE	6,000 oz
RUBBER, NATURAL	
Crude	25,000 long tons †
SHELLAC	1,500,000 lb
TALC, BLOCK	250 short tons *
TIN	4,500 long tons *
ZINC	16,000 short tons

Footnotes:

† Quantity shown refers only to purchases from the normal commercial market.

* These amounts are the presently anticipated total amounts to be purchased during the entire period July 1948 to June 1949 for delivery prior to 30 June 1949.

Westinghouse Builds Power Unit

WESTINGHOUSE Electric Corp. recently completed a unit power plant, first to be built at its Sunnyvale, Calif., plant. The 5000-kw power generating machine is destined for the Comision Federal de Electricidad of Mexico.

The unit weighs 172,600 pounds and comprises a steam turbine, generator, condenser and necessary controls and accessories. This first unit is one of 24 now under construction at Sunnyvale. Six will go to Mexico; others have been ordered for power expansion programs in progress in Colombia, San Salvador, Argentina, India and China.

Aetna Has Year's Order Backlog

AETNA-Standard Engineering Co., Youngstown, reports that it has a backlog of orders which insures full operations for the coming 12 months. Foreign orders represent about 10 per cent of the volume, and there are several projects pending for the government. Aetna produces equipment for steel and other metalworking industries.

Firm had a net profit of $974,490 in the fiscal year ending June 30, 1948. This compares to a profit of $282,941 in the 1947 fiscal year and brings to $3,771,135 the net profit for the past eight and a half years. Prior to that time, company had a long string of losses.

Metal Miners Plan Convention

METAL miners will gather in San Francisco Sept. 20 to 23 for the golden anniversary meeting of the American Mining Congress. The convention this year will be timed with the centennial of the discovery of gold in California.

Questions concerning legislative problems, such as federal subsidies, or premiums, for marginal mines, as well as operating and marketing problems will be discussed.

Program committees have scheduled 10 convention sessions, six of which will be devoted to discussions of administrative affairs, taxation matters, economic questions and legislative proposals. The other four sessions will be devoted to discussions of mine and mill operating problems.

Rearmament Program— One of the most important topics will be a survey of the rearmament and foreign aid programs and how they will affect the American mining industry. Other discussions will focus on such matters as reciprocal trade agreements, stockpiling, subsidies and other incentives to exploration and mine development, labor affairs, including the effect of the Taft-Hartley Law, industrial relations and the monetary position of gold.

On the operating side of the program, the miners will discuss mechanization developments, milling practices, safety programs, labor situations and new equipment.

As a corollary to consideration of operating techniques, equipment manufacturers are planning to make their first major postwar exhibit of new mining machinery and tools.

Body Engineers Meet Nov. 3-5

ANNUAL convention of the American Society of Body Engineers will be held at the Rackham Memorial Bldg., Detroit, Nov. 3-5. Technical sessions will cover styling; production engineering; small cars, busses and coaches; commercial bodies; body fabrication; stress analysis and testing; and passenger car body engineering. Another feature will be an industrial exhibit of body materials, parts and body hardware.

Metal Trades Group Meets

NATIONAL Metal Trades Association will hold its 49th annual convention at the Hotel Commodore, New York, Oct. 18-20. A feature of the meeting will be employer-employee communications, with emphasis on employee newspapers, letters, handbooks, bulletins, layouts, posters and other means of improving labor relations.

Calendar of Meetings . . .

Sept. 6-10, American Chemical Society: Midwest section of annual meeting, St. Louis. Society headquarters are at 60 E. 42nd St., New York.

Sept. 7-9, Society of Automotive Engineers: National tractor and diesel engine meeting, Hotel Schroeder, Milwaukee. Society headquarters are at 29 W. 39th St., New York.

Sept. 7-10, American Society of Mechanical Engineers: Fall meeting on hydroelectric resources and wood industries of Pacific Northwest, at Portland, Oreg. Society headquarters are at 29 W. 39th St., New York.

Sept. 9-10, American Ceramic Society: Fall meeting, Hotel Conneaut, Conneaut Lake Park, Pa. Society headquarters are at 2525 N. High St., Columbus, O.

Sept. 13-17, Instrument Society of America: Third instrument conference and exhibit, Convention Hall, Philadelphia. Society headquarters are at 1117 Wolfendale St., Pittsburgh.

Sept. 20-25, American Mining Congress: Metal mining convention and exposition, San Francisco. Congress headquarters are in the Ring Bldg., Washington.

Sept. 23, American Iron & Steel Institute: Regional technical meeting, Hotel William Penn, Pittsburgh.

Sept. 27-Oct. 2, Society of the Plastics Industry: Third national plastics exposition, Grand Central Palace, New York. Society headquarters are at 295 Madison Ave., New York.

Sept. 28-30, Porcelain Enamel Institute: Institute is one of sponsors of first international congress on porcelain enameling, London. Institute headquarters are at 1010 Vermont Ave., N. W., Washington.

Sept. 28-Oct. 1, Association of Iron & Steel Engineers: Annual convention and exhibition, Public Auditorium, Cleveland. Association headquarters are at 1010 Empire Bldg., Pittsburgh.

Sept. 29, American Iron & Steel Institute: Regional technical meeting, Hotel Cleveland, Cleveland.

Oct. 1-2, Southern Ohio Section of Open Hearth Committee, Iron & Steel Division and Ohio Valley Section, AIME: Annual fall meeting, Deshler-Wallick Hotel, Columbus, O.

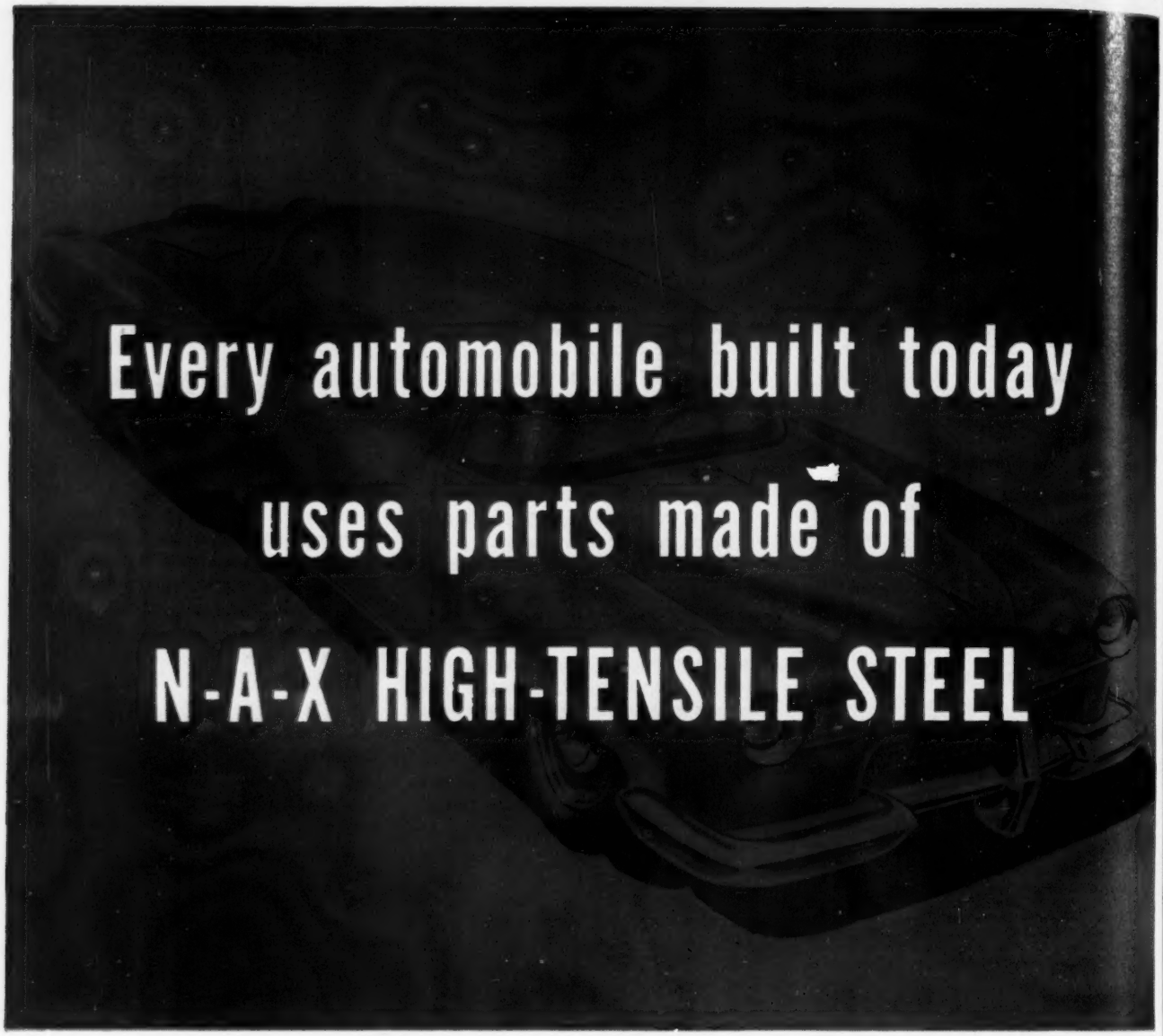
Oct. 4-7, Industrial Packaging Engineers Association and University of Illinois: First annual industrial packaging and materials handling short course, Sherman Hotel, Chicago. Association headquarters are at 20 W. Jackson Blvd., Chicago.

Oct. 4-11, American Institute of Steel Construction Inc.: Twenty-sixth annual convention, Chateau Frontenac, Quebec, Canada. Institute headquarters are at 101 Park Ave., New York.

Oct. 5-7, Industrial Packaging Engineers Association: Show at Hotel Sherman, Chicago. Association headquarters are at 20 W. Jackson Blvd., Chicago.

Oct. 5-7, American Institute of Electrical Engineers: Middle eastern district meeting Washington. Institute headquarters are at 33 W. 39th St., New York.

Oct. 5-9, Concrete Reinforcing Steel Institute: Twenty-fourth semi-annual meeting, Grove Park Inn, Asheville, N. C. Institute headquarters are at 38 S. Dearborn St., Chicago.



Since 1940, when Great Lakes Steel pioneered the application of high-tensile, low-alloy steel to cold-stamped automobile bumpers, there has been a growing trend to N-A-X HIGH-TENSILE STEEL in the automobile industry.

Today, every car manufacturer is using the inherent better properties of N-A-X HIGH-TENSILE STEEL for some part of his automobile.

Bumpers and grilles – hoods and fenders–body panels and deck lids – frames and bracings – wheels and hub caps represent a few of many applications of N-A-X HIGH-TENSILE STEEL to the modern car.

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N-A-X Alloy Division • Detroit 18, Michigan
UNIT OF NATIONAL STEEL CORPORATION

By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Three auto manufacturers, Nash, Kaiser-Frazer and Hudson, hold colorful previews for newsmen of new models but details of new lines withheld pending official release

POSSIBLY taking their cue from Hollywood, three manufacturers of automobiles have held what might be called "sneak" previews of new models over the past 10 days— Nash, Kaiser-Frazer and Hudson.

The affairs were garnished with all the color and hospitality of a formal announcement, including fine refreshments, food, souvenirs and general conviviality, but as far as making any mention of what they saw, visiting writers and editors found their hands tied pending the time when "official release" of details will be made.

So, while everybody had a good time and saw a lot of interesting things, only a few generalities can be reported.

Hotter Than a Depot Stove

THE THREE 1949 cars which Nash promotion experts drove through a paper-covered doorway into an indoor riding arena before assembled guests were alleged to be "hotter than a depot stove" and as a reminder each visitor was given a small ceramic model of said stove.

The cars themselves were among the first few pilot-line jobs to be assembled, one report being to the effect they had been off the line since as early as last April and had been under various test runs since that time. They bear no resemblance to previous models, bodies being long, low and streamlined. Investment of $15 million was involved in the changeover.

Kaiser's Is Hush-Hush Preview

KAISER-FRAZER held a hush-hush preview of its forthcoming models a week ago, officials exuding optimism at the showing which included two entirely new body types, one a convertible and the other a sort of sports sedan whose steel top was covered with padding and nylon fabric. Novel appearance was the chief explanation of this odd combination, although the covering doubtless has some insulating qualities. Varied and unusual combinations of body paint and upholstery were on display, particular emphasis being placed on light pastel shades.

These dazzling paint jobs will probably find a lively market along the West Coast and in Florida. In other sections of the country where car finishes take almost a year-round beating from ice, snow, road salt and mud, the sun-tan pinks and desert orange combinations are apt to look a little shabby after a year's operation.

K-F engineers have in the clay model stage an entry in the lower-price field, designed to compete with Ford-Chevrolet-Plymouth whenever the raw materials situation improves or a more competitive market returns.

Automobile Production

Passenger Cars and Trucks— U. S. and Canada

	1948	1947
January	422,324	366,205
February	399,460	393,663
March	519,133	443,588
April	462,315	445,137
May	359,989	404,191
June	454,388	421,466
6 mos.	2,617,609	2,474,223
July	487,766	399,456
August	477,671*	364,478
September		444,501
October		461,536
November		417,493
December		492,109
12 mos.		5,055,284

* Preliminary.

Estimates for week ended:

Aug. 14	112,342	83,501
Aug. 21	113,324	84,726
Aug. 28	102,685	88,098
Sept. 4	100,000	83,444

Estimates by Ward's Automotive Reports

Hudson Has Sleek Convertible

HUDSON'S sleek new convertible was unwrapped for the first time last Wednesday and while the affair was not strictly speaking a "sneak" preview, the car has been delayed getting into production and will be shown for the present only in a few selected areas, public announcement being deferred until dealers have more of the new jobs.

Described as a convertible brougham, the car embodies the step-down features of Hudson's earlier models and features an innovation which many convertibles have sorely needed —a rear window with a respectable amount of area for rear vision.

Hudson calls the design a "fold-away" window, comprising two sections of plate glass hinged across the middle with a special type of vinyl plastic hinge. This permits full (100 per cent more than before) vision since the plastic is transparent and also allows folding the window in half when the top is lowered into its compartment.

The convertible also has a considerably larger windshield header, serving as a stronger bracing member and also carrying built-in sun visors, a light and the radio antenna control knob. Lacking the rigidity of a steel top, the convertible also required some additional bracing members in the integral-type frame.

New DeLuxe Station Wagon

FOR THOSE who can afford the stiff tariff of sports-type cars, Oldsmobile has devised a new deluxe station wagon body, built by Fisher, providing more luggage space and finer interior appointments. Front and rear seat tubular frame rails are chrome plated, and the back and cushion of the rear seat fold forward and downward to form a level carpeted floor 7 ft in length from the driver's seat to the tail gate. Stainless steel skid rails protect the carpeting and facilitate loading of luggage. Interior is finished off with natural grained mahogany panels. Rear-wheel housings are covered with red leather which also trims the lower portion of the doors, the header above the instrument panel and sunshades.

Compare Kaiser's Earnings

SOME of those who do not share the rampant enthusiasm of Messrs. Kaiser and Frazer over their company's position point to comparison of net earnings of various manufac-

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CLASSIER: This new deluxe station wagon body in Oldsmobile's Series "60" Dynamic model is said to offer finer interior appointments and more luggage space than the standard model. Rear seat folds downward to form a level carpeted floor seven feet long from driver's seat to tail gate

turers, available for common stock in the first half of this year as against the second half of 1947.

For example, the figures show that General Motors net income was up 39.2 per cent, Chrysler up 15.2, Hudson 105, Studebaker 4.67, Packard 7.4, Willys-Overland 90.7, in contrast to a decrease of 69.5 per cent for K-F. On this score, however, it must be kept in mind that the K-F net for the last half of 1947 was better than $21.2 million, nearly 4 times the profit of Studebaker and Packard and over 10 times the net reported by Hudson. A drop to $6.2 million was experienced in the first half of this year, but the total still was higher than either Hudson or Willys-Overland and nearly on a par with Packard.

Ford Open-hearth Capacity Up

FIRST of three rebuilt open-hearth furnaces has been returned to service at the Ford open-hearth furnace department, capacity increased by about 30 per cent to 200 tons. Ten furnaces make up the battery. No. 7 was the first to be enlarged. No. 6 now being under construction will be ready for operation in about ten weeks, after which No. 5 will go down. The No. 7 project required about 1200 yards of concrete, 400 tons of structural steel, 700,000 brick and 150,000 board feet of lumber for forms.

An extension also is being added to the south end of the open-hearth building to provide more space to store ore and limestone because of the increased furnace capacity. The addition will be 99 ft long and 168 ft wide, divided into bins which will hold 1250 tons of ore, 1500 tons of limestone and 250 tons of feed ore. Scheduled to be ready by the end of the year, the new space also will house two hot metal ladle pits to handle hot metal from the new blast furnace now nearing completion.

Hudson Resumes Production

HUDSON was able to resume production at about 50 per cent of normal last week as supplies of cylinder blocks were received from Wilson Foundry & Machine Co. in Pontiac and later from Lakey Foundry & Machine Co. in Muskegon, Mich. Blocks formerly had been furnished by Campbell, Wyant & Cannon in Muskegon, which has been on strike since June 14.

It appeared C-W-C might be back in production finally last week after the company and union agreed to abide by decisions of a federal conciliation service panel. Whether the determinations of the panel would remove the intense bitterness which had developed between company management and ambitious leaders of the foundry union local was problematical. Head of the local had filed a $100,000 libel suit against a company official, and earlier efforts to bring the disputing parties together without starting a blast of verbal fireworks had proved futile.

Return of the C-W-C foundries to full operation will ease Chrysler's problems in keeping enough camshafts supplied to motor lines in order to substain production.

Auto Prices—1941 vs. 1948

ADVERTISED delivered prices for passenger cars, at point of manufacture, including delivery and handling charges and federal taxes, but not including state taxes, transportation or optional equipment, follow:

	1941	May, 1948	Sept., 1948	Increase over 1941 $	Increase over 1941 %
Buick 40, 4-dr.	$1052	1673	$1809	$757	72
Buick 50, 2-dr.	1185	1929	1987	802	68
Buick 70, 4-dr.	1364	2232	2418	1054	77
Cadillac 61, 4-dr.	1535	2647	2833	1298	84
Cadillac 62, 4-dr.	1585	2781	2996	1411	88
Cadillac 75, 4-dr.	2995	4471	4779	1784	60
Chevrolet, master-del. vs. Stylemaster 4-dr.	754	1276	1371	617	82
Chevrolet, spec.-del. vs. Fleetmaster 4-dr.	810	1345	1439	629	78
Chrysler Royal, 4-dr.	1051	1773	1980	929	88
Chrysler Windsor, 2-dr.	1075	1805	2014	939	87
Chrysler New Yorker, sp. cpe.	1268	2195	2420	1152	91
DeSoto, 4-dr. deluxe	995	1656	1845	850	85
DeSoto, 4-dr. custom	1045	1709	1911	866	83
Dodge, 2-dr. deluxe	880	1513	1696	816	93
Dodge, 4-dr. custom	965	1608	1808	843	87
Ford V-8 bus. cpe.	695	1255	1433	738	106
Ford V-8 4-dr.	775	1375	1560	785	101
Ford V-8 Superdel. vs. Custom 2-dr.	780	1415	1602	822	105
Ford V-8 Superdel. vs. Custom 4-dr.	820	1475	1665	845	103
Hudson Commodore 8, spt. cpe.	1040	2226	2387	1347	130
Hudson Commodore 6, 4-dr.	994	2161	2301	1307	131
Nash 600, 4-dr.	780	1464	1543*	763	98
Nash Ambassador 6, sed-cpe.	974	1763	1858*	884	91
Oldsmobile 66, 6, 4-dr.	945	1556	1677	732	77
Oldsmobile Futuramic vs. Cust. Cruiser, 8, 4-dr.	1135	1993	2151	1016	90
Packard, del. 8 vs. 120, 4-dr.	1261	2375	2543	1282	102
Packard, sup. 8 vs. 160, 4-dr.	1750	2690	2827	1077	62
Packard cust. 8 vs. 180, 4-dr.	2587	3675	3750	1163	45
Plymouth del. 2-dr.	779	1247	1397	618	79
Plymouth spec. del. 4-dr.	840	1378	1544	704	84
Pontiac Torpedo 6, sed.-cpe.	864	1484	1614	750	87
Pontiac Streamliner 8, sed-cpe.	948	1595	1724	776	82
Studebaker Champion 2-dr.	795	1514	1604	809	102
Studebaker Commander 2-dr.	1050	1819	1925	875	83

* 1948 model; prices on 1949 not revealed, although probably to be higher.

Note: Some changes in model designations, inclusion of extra equipment as standard and other refinements of the pricing structure make exact comparisons in all cases difficult; however, as nearly as possible, the attempt has been made to select comparable models. Unweighted for production volume, average price increase for all the above makes over 1941 is $942 or 87.7 per cent. Transportation, state taxes and optional equipment usually will add anywhere from $300 to $600 to the above prices.

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More Jet Components

Steel Improvement completes expansion to up gas turbine blade output three-fold

STEEL Improvement & Forge Co., Cleveland, has completed a $300,000 expansion program which will permit a three-fold increase in production of forged gas turbine blades for the Air Force's jet engine program.

Begun in April, 1948, this expansion will add 5000 sq ft immediately and eventually 10,000 sq ft to the productive area of the plant. Operation of the new facility will double the number of men presently employed in the Turbine Forging Division. Improved production methods, as well as more manufacturing area and personnel, will account for the three-fold increase in output.

New Equipment—The new equipment includes six forging hammers, trimming presses and electric furnaces. Each hammer is mounted on a 30-ton block of concrete which rests on 36 springs attached to "I" beams set in the block. These springs, supporting a total weight of 60 tons, absorb all the vibration of the forging operation. Hammers were manufactured by Chambersburg Engineering Co., Chambersburg, Pa., and Erie Foundry Co., Erie, Pa. The spring mounting is an application of the foundations of the Korfund Co., New York.

This expansion had its beginning in the turbo supercharger program of the prewar years. Steel Improvement, as a supplier of General Electric Co., devised a method of forging turbine wheels for superchargers that reduced by one-third the amount of steel required and considerably lessened the machining needed.

SMALL SCALE MODEL FOR BIG SCALE SELLING: Far cry from the old door-to-door agent is the modern salesman-engineer for industrial goods which in many cases cost thousands of dollars. E. W. Stephens, above, manager of belting sales for Goodyear, uses a relief map in laying out in miniature a proposed cross-country belt conveyor system

Westinghouse Buys Into Baldwin

WESTINGHOUSE Electric Corp. has made settlement for the purchase from Baldwin Locomotive Works of 500,000 shares of the latter's common stock, according to M. W. Smith, executive vice president of Baldwin. The stock is part of the 3 million common shares authorized.

The purchase price totaled $7,555,000, of which $6 million will be used to pay Baldwin's outstanding bank loans and the remainder will be added to working capital. The purchase represents about 21 per cent of Baldwin common and, with a small block of stock previously acquired, will give Westinghouse a 21.68 per cent interest in the $13 par common stock of the company.

It is expected that several of the top executives of Westinghouse will be elected directors of Baldwin. Mr. Smith, Baldwin's executive vice president, was until last month the Westinghouse vice president in charge of engineering and research. The two companies have long been associated in the development of various types of locomotives.

Keystone Maintains High Output

MAINTENANCE of steel production at record levels and increased output of steel products featured the fiscal year ending June 30, 1948, for Keystone Steel & Wire Co., Peoria, Ill.

The company turned out 286,357 net tons of steel in the last fiscal year, which was almost identically the same as in the preceding year, while shipments of 281,458 net tons of products during the fiscal year compared with previous record shipments of 277,368 net tons in 1945. The increased production was made possible by extensive plant expansion and modernization, with Keystone spending $1,407,547 during the year for additions to plant and equipment. Unexpended appropriations and commitments for additional plant facilities amount to about $982,000.

Net profit for the year of $4,311,477 compares with $4,837,955 for fiscal 1947. Higher costs account for the decline in profit in spite of the increased sales of $33,180,747 which exceeded the previous year's total of $27,967,083 by 19 per cent. Keystone's final sales policy on the question of basing point pricing has not yet been determined.

New Ferroalloy Plant for Ohio

PLANS for erection of a ferroalloy plant near Marietta, O., have been announced by Electro Metallurgical Co., unit of Union Carbide & Carbon Corp.

Construction will start in the near future at a site on the Ohio river about six miles south of Marietta. Facility will be served by river and rail transportation and will be used for production of silicon, manganese and chromium alloys utilized in the manufacture of steel and iron. Of the raw materials required for initial operations, silica rock and coke will be obtained from local sources.

Stewart-Warner Sales Drop

STEWART-WARNER Corp., Chicago, reports decreased sales but increased earnings for the first half of 1948 as compared with sales and earnings for the same period of 1947.

First half sales were $37,869,485, down 5.7 per cent from sales for the same period last year. Net earnings for the period ended June 30, 1948, were $1,874,601, compared with $1,366,872 for the first half of 1947.

Briefs . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Koppers Co. Inc., Pittsburgh, announces its Engineering & Construction Division has set up a new Chemical Section to supervise and co-ordinate engineering and construction work on chemical plants. Heading the section will be T. M. Osborne, who has been project manager for Koppers in construction of the $4,500,000 synthetic liquid fuels plant for the government at Louisiana, Mo.

—o—

Lindberg Steel Treating Co., Chicago, will open a new custom heat treating plant, now under construction in St. Louis on or about Nov. 1. New building at 650 E. Taylor Ave. will have 6000 sq ft of floor area to house 14 furnaces, including three for toolroom tempering.

—o—

B. C. Ames Co., Waltham, Mass., manufacturer of micrometer dial gages and indicators, has appointed Geoffroy Co., Denver, as its agent in Colorado, Utah and Wyoming.

—o—

Union Iron Works, Erie, Pa., manufacturer of heat exchangers, special chemical processing equipment and many other products, has appointed Chemical Pump & Equipment Corp., New York, as its representative for eastern New York state and western Connecticut.

—o—

Phillips Petroleum Co., Bartlesville, Okla., has opened an office at 212 Sixth St. S., Minneapolis, to handle sales of liquefied petroleum gas in Minnesota, North and South Dakota. L. G. Platt will be in charge of the office.

—o—

Lord Mfg. Co., Erie, Pa., manufacturer of vibration control mountings for aircraft and other applications, has opened an office at 238 Lafayette St., Dayton, O., with W. W. Dalton in charge.

—o—

Sperry Products Inc., manufacturer of electrical and ultrasonic instruments, hydraulic remote controls and other testing and control devices, has moved from Hoboken, N. J., to its new plant at Danbury, Conn.

—o—

Nice Ball Bearing Co. is expanding manufacturing facilities at its plant at 30th and Hunting Park Ave., Philadelphia.

—o—

Resistance Welder Manufacturers' Association, Philadelphia, reports shipments of resistance welding equipment by member companies continued to climb in July, with gain of almost $500,000 worth of equipment shipped as compared with the previous month. July shipments were nearly four times those in the corresponding month of 1939, the best prewar year.

—o—

Allen-Bradley Co., Milwaukee, manufacturer of electric motor controls, has moved its northern Ohio district office to 4312 Carnegie Ave., Cleveland. R. J. Roy continues as district manager.

—o—

Hanover Steel Corp., New York, distributor of steel products, has opened a Philadelphia office in the Beury Bldg. Joseph H. Kerschbaum is in charge. Hanover is a subsidiary of Solar Steel Corp.

—o—

A. O. Smith Corp., Milwaukee, has taken over the assets of Burkay Co., Toledo, O., manufacturer of volume water heaters, home heating boilers and gas conversion burners. For several years Smith has been marketing the Burkay volume water heater.

—o—

Westinghouse Electric Corp., Pittsburgh, has registered 900,000 shares of common stock for purchase by employees at $3 below the average market price during the month the stock is bought. Each employee may purchase one share for each $200 of his annual wage.

—o—

Ajax Flexible Coupling Co. Inc., Westfield, N. Y., maker of couplings, conveyors, screens, shakers and packers, has appointed A. W. Nash Co., Los Angeles, as its representative in Southern California.

—o—

United States Maritime Commission announces 14 vessels of design suitable for salvage or repair work, or as bulk or heavy lift carriers, are available for sale under the Merchant Ship Act of 1946. Four are at Wilmington, N. C.; six at Suisun Bay, Calif.; and four in the James river in Virginia.

—o—

Youngstown Sheet & Tube Co., Youngstown, will hold open house at its Indiana Harbor, Ind., steel plant and tin mill Sept 15.

—o—

Handling Devices Inc. has been formed at 581 Boylston St., Boston, to distribute nationally the Jack-O-Might, a 1-ton capacity pallet truck. Sherman Industries, division of Sallinger-Sherman Inc., Boston, manufactures the truck.

—o—

Permanente Cement Co., Oakland, Calif., a Kaiser affiliate, has exercised an option to purchase 498 acres of land near Helena, Mont., as a possible site for a cement plant.

—o—

American Society of Tool Engineers reports that work has begun on its new headquarters on Puritan Ave. in northwest Detroit. Occupancy is expected by Nov. 1.

—o—

Steep Rock Iron Mines Ltd., Steep Rock Lake, Ont., Canada, reports last year it established a production record of 1,206,406 tons of high grade iron ore mined.

—o—

Voss Brothers Mfg. Co., Davenport, Iowa, manufacturer of household washing machines and related products, has begun production on stainless steel double wash tubs. The line will augment the company's present output of porcelain enameled tubs.

—o—

Marengo Foundry Co., Marengo, Ill., a gray iron shop, has been purchased by Herbert J. Schmitz, president of Central Architectural Iron Works and Farm-Rite Implement Co., both of Chicago. W. T. Milles, previous owner of the foundry, had suspended operations July 16 following a labor dispute. Operations were resumed last month under the new ownership.

—o—

Steel Co. of Canada will hold an open house at its Hamilton, Ont., works Oct. 5 and 6.

—o—

Gray Iron Founders' Society, Cleveland, has launched another management group of gray iron foundry executives for eastern New York state. Heading the new unit, which will have headquarters in Syracuse, is Wallace E. Thomas, president, Straight Line Foundry & Machine Corp.

—o—

Bendix Home Appliances Inc., South Bend, Ind., reports factory shipments by all manufacturers of automatic washing machines this year may exceed 1 million units. In the first half of this year, shipments totaled 500,000 units, and shipments are normally heavier in the second half.

—o—

General Electric Co., Schenectady, N. Y., has appointed Graybar Electric Co. as national distributor for all GE insulating materials except friction and rubber tapes.

The Business Trend

SUMMER heat caused a slight dip in industrial activity during the week ended Aug. 28, lowering STEEL's industrial production index to a preliminary 170 per cent of the 1936-1939 average after reaching a high of 172 in the preceding week.

Steel ingot output moved contrary to the general picture and rose to 96 per cent of capacity, the highest level in two months. Bituminous coal production was 12,315,000 net tons for the week ended Aug. 21, 145,000 tons less than the week before but 327,000 tons higher than the corresponding week a year ago.

AUTOMOBILES—After successfully struggling with supplier problems and maintaining high output through most of August, the nation's automobile builders lost a round to the heat wave, resulting in a drop of more than 10,000 units produced. In spite of the lowered output for the latest week, August volume will be higher than had seemed possible in view of vendor difficulties.

PRODUCTION—Despite August heat, the seasonally adjusted industrial production index of the Federal Reserve System is expected to be higher than the July level which was 187 per cent of the 1935-1939 average. The July decline of 5 per cent from the June figure reflected in large part the effects of employee vacations, especially in certain nondurable industries, but was 11 per cent higher than July, 1947.

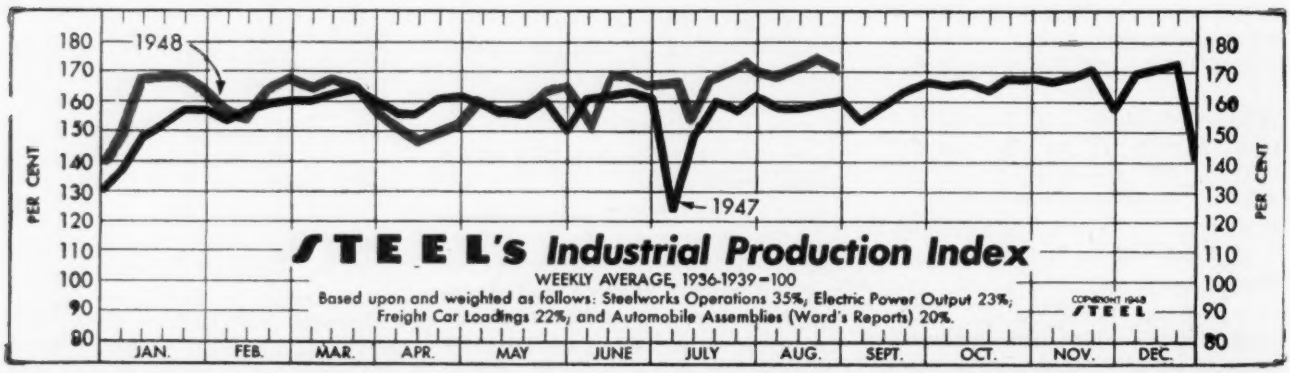
MANUFACTURERS' SALES—Factory closings for vacation periods caused a decline in July manufacturers' sales, which were about 10 per cent below June both in total value and in daily average rate. Total sales were $16 billion of which $6.4 billion were durable goods. The volume of durable goods sales was $700 million less than the total for June, according to the Commerce Department.

MANUFACTURERS' INVENTORIES—A growth in book values of manufacturers' inventories was recorded during July, moving above the $30 billion mark by the end of the month. The Commerce Department reported that much of the increase, which exceeded $300 million for the month, stemmed from customary early summer accumulations.

PETROLEUM—Crude petroleum output for July was exceptionally high and continued to rise during August. Daily production in the latter month averaged almost 5.5 million barrels.

CONSTRUCTION — Total of construction contracts awarded in July in the states east of the Rockies amounted to approximately $963 million. This was 46 per cent higher than the amount reported for July of last year and 3 per cent higher than the total for June of this year. The investment commitment volume for this year through July is 38 per cent higher than that reported for the first seven months of last year.

PRICES—Bureau of Labor Statistics wholesale price index returned to the postwar peak of 169.2 per cent of the 1926 average for the week ended Aug. 21 after a slight decline in preceding week.



Index (chart above): Week ended Aug. 28 (preliminary) 170 Previous Week 172 Month Ago 170 Year Ago 160

BAROMETERS of BUSINESS

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)†	96.0	95.0	93.0	93.0
Electric Power Distributed (million kilowatt hours)	5,478	5,391	5,352	4,940
Bituminous Coal Production (daily av.—1000 tons)	2,052	2,076	2,020	1,998
Petroleum Production (daily av.—1000 bbl.)	5,529	5,521	5,455	5,157
Construction Volume (ENR—Unit $1,000,000)	$95.2	$117.1	$114.3	$136.9
Automobile and truck output (Ward's—number units)	102,685	113,324	113,270	88,098

* Dates on request. † 1948 weekly capacity is 1,802,476 net tons. 1947 weekly capacity was 1,749,928 net tons.

TRADE				
Freight Carloadings (unit—1000 cars)	910†	901	894	926
Business Failures (Dun & Bradstreet, number)	96	94	98	64
Money in Circulation (in millions of dollars)‡	$27,965	$27,979	$27,821	$28,302
Department Store Sales (changes from like wk. a yr. ago)‡	+12%	+14%	+8%	−5%

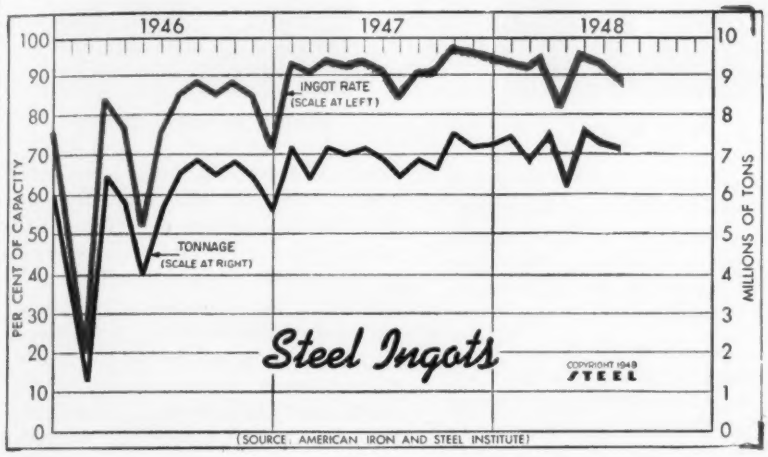
† Preliminary. ‡ Federal Reserve Board.

Steel Shipments

(Net Tons)

	1948	1947	1946
Jan.	5,410,438	5,061,333	2,189,369*
Feb.	5,046,115	4,626,424	2,189,368*
Mar.	5,978,551	5,304,415	4,213,913
Apr.	5,096,161	5,445,993	4,335,694
May	5,321,375	5,442,343	3,666,677
June	5,476,774	5,263,711	3,687,509
July	.....	4,974,566	4,259,494
Aug.	.....	5,278,223	4,965,456
Sept.	.....	5,118,839	4,589,902
Oct.	.....	5,681,597	5,260,832
Nov.	.....	5,216,990	5,019,984
Dec.	.....	5,613,036	4,533,420

* Figures for January and February, 1946, are merely averages derived from a report that combined shipments for those two strike-affected months into a total of 4,378,737.



Steel Ingots

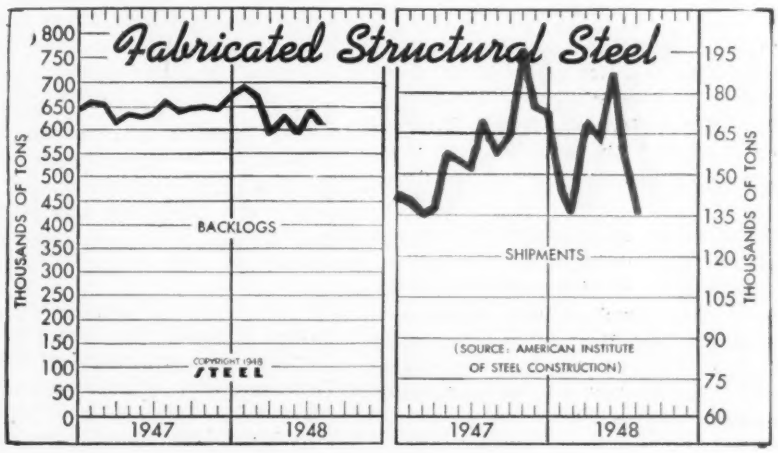
	Production (Net Tons—000)			Operating Rate (% of Capacity)		
	1948	1947	1946	1948	1947	1946
Jan.	7,473	7,213	3,873	93.6	93.0	49.6
Feb.	6,940	6,422	1,393	93.0	91.7	19.8
Mar.	7,608	7,307	6,509	95.3	94.3	83.3
Apr.	6,218	7,043	5,861	80.4	93.8	77.5
May	7,560	7,329	4,073	94.7	94.5	52.2
June	7,256	6,969	5,626	93.8	92.8	74.4
July	7,078	6,570	6,619	88.8	84.9	84.9
Aug.	....	6,982	6,924	...	90.1	88.7*
Sept.	....	6,789	6,556	...	90.6	86.9
Oct.	....	7,560	6,952	...	97.5	89.0
Nov.	....	7,233	6,458	...	96.3	85.4*
Dec.	....	7,366	5,760	...	95.2	73.9
Total		84,784	66,603	Ave.	92.9	72.5

Fabricated Structural Steel

(000 Tons)

	Shipments			Backlogs		
	1948	1947	1946	1948	1947	1946
Jan.	146.4	140.6	107.5	692	661	552
Feb.	141.6	136.1	63.8	673	656	551
Mar.	167.0	137.8	102.8	597	614	605
Apr.	166.7*	157.4	122.5	630	632	674
May	186.9*	155.0	124.4	593	628	615
June	157.1*	151.9	126.8	647	634	642
July	135.6*	169.9	140.2	613	661	674
Aug.	....	158.0	157.5	...	639	651
Sept.	....	164.3	141.9	...	648	682
Oct.	....	196.1	164.7	...	649	660
Nov.	....	175.0	157.3	...	645	665
Dec.	....	173.0	142.1	...	671	646
Total	....	1,915.1	1,551.6			

* Revised.



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$12,213	$13,855	$13,016	$11,980
Federal Gross Debt (billions)	$253.2	$253.4	$253.4	$260.0
Bond Volume, NYSE (millions)	$11.5	$12.1	$14.5	$13.4
Stocks Sales, NYSE (thousands)	2,850	3,076	4,490	3,059
Loans and Investments (billions)†	$63.4	$63.0	$63.2	$63.6
United States Gov't. Obligations Held (millions)†	$34,904	$34,660	$34,879	$38,527

† Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$93.55	$93.55	$90.05	$75.41
All Commodities†	169.2	169.0	168.2	153.5
Industrial Raw Materials†	182.8	182.5	184.6	167.7
Manufactured Products†	164.9	164.7	163.1	148.3

† Bureau of Labor Statistics Index, 1926=100.

Men of Industry

W. W. SIEG

A. R. KELSO

CARROLL M. BAUMGARDNER

W. W. Sieg has been elected president of Titan Metal Mfg. Co., Bellefonte, Pa., succeeding **W. P. Sieg** who was appointed vice chairman of the board of directors and chairman of the executive committee. The new president joined the firm as a metallurgist after previous association with Ingersoll-Rand Co. and Rome Brass & Copper Co. and rose to the position of executive vice president prior to his present appointment.

—o—

M. K. Schnurr has been elected president and treasurer and a director of Stainless Products Inc., Elizabeth, N. J. **P. F. McEvoy** and **H. F. Wyman** have both been elected vice presidents and directors of the firm.

—o—

Appointment of **Robert R. Rector** as district representative for the Southern Division of American Coach & Body Co., Cleveland, was announced recently. Mr. Rector has been with the company for the last two years and spent the last year in production control department.

—o—

F. O. Wahlstrom, president of Southern States Iron Roofing Co., Savannah, Ga., has been appointed Swedish vice consul in Savannah. Mr. Wahlstrom was born in Sweden and came to this country in 1925. He joined Southern States in 1934 as manager of their Baltimore plant and was made president in 1942.

—o—

W. N. Goodwin Jr., former vice president in charge of research and engineering, Weston Electrical Instrument Corp., Newark, N. J., was honored recently upon completing 50 years of association with the company. Mr. Goodwin was responsible for development of many of Weston's instruments and although he is now officially retired, he still serves the company as a consultant and continues his studies in the field of instrument design.

—o—

A. R. Kelso has been appointed executive vice president of Federal Machine & Welder Co., Warren, O. In his new capacity, Mr. Kelso is in administrative charge of all divisions, which include Warco Press Division, Federal Welder Division and Warren Stamping Division.

—o—

Sperry Products Inc., Danbury, Conn., announces the appointment of **Edward B. Lang** as advertising manager. Mr. Lang was formerly with the Public Relations Department, General Electric Co.

—o—

Robert J. Powell has been named refractory sales engineer for Alabama, Tennessee and western Georgia and Florida by Babcock & Wilcox Co., New York. Mr. Powell, who has had nearly fifteen years' experience in the production of B & W refractories and their sale and application for industrial use, will make his headquarters in Atlanta.

—o—

William R. Bajari has been appointed to board of regional sales supervisors, Eutectic Welding Alloys Corp., New York. Formerly a Eutectic field manager, Mr. Bajari is now regional sales supervisor in the western region of the United States.

—o—

A. H. Graham has been named manager, Direct Current Armored Motor Engineering Division, Small and Medium Motor Divisions, Erie, Pa., works, General Electric Co. Mr. Graham was section engineer of the design section for the division, prior to his present appointment.

—o—

National Radiator Co., Johnstown, Pa., announces election of **Carroll M. Baumgardner** as vice president for sales, succeeding **John C. Barnes** who resigned. Mr. Baumgardner recently resigned as executive vice president and director of United States Radiator Corp. and also as president and director of Capital Finance Corp. He is also chairman of the executive committee of Institute of Boiler & Radiator Manufacturers and a director of Plumbing & Heating Industries Bureau.

—o—

Nathaniel C. Fick has been recently appointed deputy executive director of the Committee on Basic Physical Sciences, Research & Development Board, Washington. Mr. Fick has been metallurgist with Battelle Memorial Institute for the last five years and prior to that time he had been associated with several concerns including Carnegie - Illinois Steel Corp., U. S. Steel Corp. research laboratory and Basca Mfg. Co.

—o—

Ervin A. Huza has been added to the staff of the Philadelphia office of Gisholt Machine Co., Madison, Wis. **P. R. Foseid** will continue in charge of the territory.

—o—

J. C. McKenna, for the past six months product manager of chromium chemical sales for Diamond Alkali Co., Cleveland, has been named product manager of alkali sales. He succeeds **J. D. Mattern,** who retired in mid-August after 25 years' service

. . . are Tinnerman SPEED NUTS*

Countless manufacturers in the automotive, aircraft, radio, appliance, electrical and many other industries are using the SPEED NUT brand of fasteners . . . to reduce assembly time and cost . . . to improve product quality.

SPEED NUTS can cut *your* assembly costs, too, because they can be applied faster . . . they eliminate assembly operations, such as welding, clinching, riveting . . . and, in many cases, they combine several parts into one.

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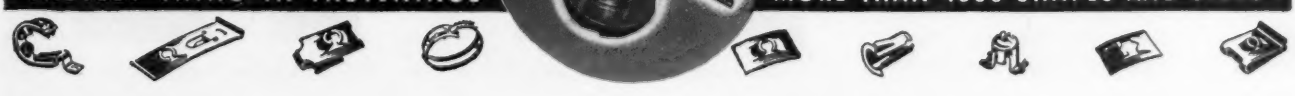
FASTEST THING IN FASTENINGS — MORE THAN 4000 SHAPES AND SIZES



with the company. **Charles E. Grant,** formerly assistant to the president of Martin Dennis Co., which firm was acquired recently by Diamond Alkali, will take the post vacated by Mr. McKenna.

—o—

D. K. Tasker, who organized and directed F-47 (Thunderbolt) field service for Republic Aviation Corp., Farmingdale, Long Island, N. Y., during World War II, has returned to the company and will serve as assistant to the president on special assignment. During the war, Mr. Tasker extended Thunderbolt field service to more than 140 bases to meet requirements of the Air Force.

—o—

Election of **Rear Adm. Ellery W. Stone (USNR)** as president and **Gen. William H. Harrison** as chairman of the board of both Federal Telephone & Radio Corp., New York, and its manufacturing and sales subsidiary, International Standard Electric Corp., was announced recently by International Telephone & Telegraph Corp., New York, parent concern of the two companies. **Fred T. Caldwell,** former president, was elected vice chairman of both corporations.

—o—

Rowland J. Miller, formerly general sales manager for appliances of Ohio Fuel Gas Co., has become associated with Clayton & Lambert Mfg. Co., Louisville, as special assistant to the president. Mr. Miller's duties will be confined initially to the development and co-ordination of merchandising and distribution plans for the company's newly developed household refrigerator.

—o—

Virgil C. Rice has been promoted from director of product planning to director of manufacturing by Bendix Home Appliances Inc., South Bend, Ind. He succeeds **Harry L. Spencer,** who resigned to become director of manufacturing for Norge Division, Borg-Warner Corp. Mr. Rice joined Bendix in 1943, as factory manager and in 1945 was appointed to the position he held until his recent promotion.

—o—

E. W. Chapman, joined Tuthill Pump Co., Chicago, Sept. 1, as vice president in charge of engineering. Prior to his appointment with Tuthill, Mr. Chapman served in a similar position for Bowser Inc., Industrial Pump Division.

—o—

E. D. Wolcott was re-named president and general manager of B & T Metals Co., Columbus, O., at a special meeting of the board of directors after the recent death of **Lyman B. Kilgour,** founder of the firm. In the new election of officers, Mr. Wolcott was also made treasurer of the firm. **R. S. Inboden,** who retains his position as general sales manager, was also elected vice president.

—o—

E. J. Roehl, manager of technical development, Thomas Steel Co., Warren, O., was recently awarded the American Electroplaters' Society gold medal for the best paper published during 1947-48. Mr. Roehl has been with Thomas Steel Co. since April of this year and previously was associated with International Nickel Co. in the Research Department.

—o—

W. J. Koenen has been named manager of the Milwaukee Division, Cherry-Burrell Corp., Chicago. Mr. Koenen, who has been factory superintendent, succeeds the late **J. W. Fogg.**

—o—

Advancement of four executives was announced recently by Minnesota Mining & Mfg. Co., St. Paul. **Allan H. Butz,** former sales manager for related products (Abrasives Division), has been appointed general sales manager for related products and will also act as an adviser in the management group of coated abrasives and related products. **C. C. March** will be responsible for management of manufacture of coated abrasive products. **Alfred L. Gilstad** has been promoted to manager of planning and service for the Abrasives Division. **Gilmore A. Salmon** is the new merchandising manager for all coated abrasives.

—o—

Rear Adm. Robert W. Cary, USN (retired) has been appointed assistant to executive vice president, Willys-Overland Motors, Toledo, O. **Wade Shurtleff** has been named to fill the position of director of industrial relations and personnel, formerly held by Adm. Cary. **C. L. Johnson** has been appointed manager of plant facilities to succeed **George F. Bluth,** who has become chief inspector.

—o—

Edwin C. Hoelzel has been named general works manager of Youngstown Steel Door Co., Cleveland, and **Howard J. Evans** has been appointed assistant works manager. Both men have been with the company since it started its Youngstown plant 19 years ago. Mr. Hoelzel previously was works manager and Mr. Evans was assistant to the vice president.

—o—

Prof. Gregory J. Comstock has been retained by Lake Erie Engineering Corp., Buffalo, as consultant of all matters relating to the field of powder metallurgy and application of equipment thereto. Prof. Comstock will not only serve the company in a consulting capacity, but will carry on extended research and development work in powder metallurgy as applied to hydraulic press design and applications.

—o—

Sheldon Thomas, former assistant to vice president in charge of production, American Car & Foundry Co., New York, has been appointed assistant district manager of the company's Chicago plant. Mr. Thomas, who has been with the company since 1940, was engaged with matters pertaining to manufacturing and production while in the vice president's office.

—o—

Patterson Foundry & Machine Co., East Liverpool, O., has announced the appointment of **James H. Hood Jr.,** as assistant manager of the company's new office in Boston. Mr. Hood will service the New England territory where he has a wide acquaintance

REAR ADM. ROBERT W. CARY

JAMES H. HOOD JR.

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JONES & LAUGHLIN STEEL CORPORATION

MARVIN LEEPER

H. L. SMALLEY

GERHARDT BARTZ

among chemical processing plants. He was formerly connected with Inspection Division, Stone & Webster Engineering Corp.

—o—

Marvin Leeper has been named plant engineer at Gary, Ind., plant of American Bridge Co., succeeding **C. J. Kennedy** who died recently. Since joining the company in 1926, Mr. Leeper has been a draftsman, supervisor and most recently drawing room engineer.

—o—

Automatic Die & Production Co., Cleveland, announces the following changes in its organization: **F. A. Brandes,** chairman of the board; **R. W. Breckenridge,** president and treasurer; **H. W. Breckenridge,** vice president; **A. C. Smith,** secretary; **G. B. Gymer,** assistant treasurer; **H. S. Lawrence,** sales manager and **Carl Koeppe,** superintendent.

—o—

Sylvania Electric Products Inc., New York, has named **Edward J. Lynch** as manager of Warehouse Service, a new department created to handle the company's products. Mr. Lynch, formerly manager of office methods and planning, will make his headquarters in Salem, Mass.

—o—

Freeman H. Dyke, assistant general manager of Wheeling Steel Corp.'s Steubenville, O., plant, has been named manager of operations for Pacific Steel Co. of Chile. Mr. Dyke has been with Wheeling Steel continually since 1923 and in 1946 served as president of the Association of Iron & Steel Engineers.

—o—

Westinghouse Electric Corp., Pittsburgh, announces appointment of **E. B. Bremer** as electrification manager in the northwestern district. Mr. Bremer is a veteran of 30 years with Westinghouse and until his present appointment served as manager of the small motor section of the Industrial Division.

—o—

Harbison-Walker Refractories Co., Pittsburgh, announces appointment of **H. L. Smalley** as assistant to the vice president, with general supervision over the company's Chicago, Indianapolis and Detroit districts. Mr. Smalley has been with Harbison-Walker since 1922 and was sales manager of the Chicago district prior to his present appointment. **Harold S. Dunn** has been named sales manager of the Pittsburgh district for the company after holding a similar post in Portsmouth, O., for a number of years. **John H. Owen,** another veteran of more than twenty years' service with the company, is the newly appointed Chicago district sales manager.

—o—

J. D. Quinn has been appointed assistant to the president of Jersey Shore Steel Co. Inc., Jersey Shore, Pa.

—o—

John Druml and **Samuel W. Ouweneel** have been named chief inspectors of the general machinery and tractor divisions respectively of Allis-Chalmers Mfg. Co., Milwaukee. They succeed **G. William Warner** who retired. Both Mr. Druml and Mr. Ouweneel held the positions of assistant chief inspector before taking over their present duties.

—o—

Richard H. Turk, president, Pemco Corp., Baltimore, has been elected second vice president and chairman of the finance committee, Armed Forces Chemical Association.

—o—

Appointment of **Gene P. Hopkins** as general works manager, Nelson Stud Welding Division, Morton-Gregory Corp., Lorain, O., was announced recently by the company. Mr. Hopkins joined the firm as assistant works manager in 1946 following association with B. F. Goodrich Co., and Stevenson, Jordan & Harrison Inc., consulting management engineers.

—o—

Gerhardt Bartz has been appointed plant superintendent of Ford Motor Co.'s spring and wheel plant, Hamilton, O. Until recently he was plant engineer of the Dodge forge plant, Chrysler Corp.

—o—

C. S. Brach has been appointed cost and price manager in the Specialties Division at Salem, Va., Yale & Towne Mfg. Co. He joined the company's Stamford Division in 1928, and served for 15 years in various positions in the specialties sales department. After service in World War II, Mr. Brach returned to the specialties sales department as a sales correspondent, the position he held until his new appointment and transfer to the new Specialties Division at Salem.

—o—

Mitchell P. Miller has been appointed manager of product design for Service & Parts Division, Philco Corp., Philadelphia. During his 25 years' association with the company, Mr. Miller has held various positions connected with automobile radio servicing and most recently he has served as both auto radio service manager and as manager of field service representatives, home and mobile radio service, for the division.

—o—

Jones & Laughlin Steel Corp., Pittsburgh, announces the following changes effective Sept. 1: Retirement of **J. C. Madson,** general superintendent, Benson Mines, Jones & Laughlin Ore Co., Star Lake, N. Y. **William R. Webb,** assistant general superintendent, will succeed Mr. Madson as general superintendent. **J. O. Peterson,** chief clerk at Benson Mines,

transferred to Inter-State Iron Co., Virginia, Minn., to be succeeded by **Wallace J. Fisher** of the General Accounting Department, Pittsburgh. **Carl Djuvik** has been appointed resident engineer at Benson Mines.

—o—

R. S. Reynolds Jr. was elected president of Reynolds Metals Co., Richmond, Va., succeeding his father, **R. S. Reynolds Sr.,** who remains as chairman of the board. The new president had served as vice president and treasurer of the company prior to the recent election. **M. M. Caskie,** vice president and director, was appointed executive vice president and **Kenneth Mann** has been named manufacturing vice president. **Calvin Coghill,** assistant treasurer, has been nominated to succeed R. S. Reynolds Jr. as treasurer.

—o—

Morris G. Gardner has been named technical director, Newark, N. J., Paint Division, Pittsburgh Plate Glass Co., Pittsburgh, succeeding **R. T. Ubben,** who was transferred to the technical directorship of the firm's Milwaukee Division. Mr. Gardner has been associated with the paint industry in technical capacities for 30 years, joining Pittsburgh Plate in 1935.

—o—

A. Cristello has become affiliated with American Light Alloys Inc., Little Falls, N. J., as executive vice president. Mr. Cristello has been prominent in the nonferrous foundry industry for the past 20 years. His latest position being manager, Eclipse Pioneer Foundries, Bendix Aviation Corp.

ANTHONY SIRAGUSA

—o—

Anthony Siragusa, who has just been appointed assistant to vice president in charge of purchasing, U. S. Steel Corp., Pittsburgh, will move to the corporation's main office from New York where he was supervising buyer in the purchasing division. Mr. Siragusa will continue to be in charge of the purchasing which he formerly handled, as the New York office will be consolidated with the main office on Sept. 1.

—o—

Charles B. Cleevely has been appointed assistant superintendent of maintenance, Campbell works, Youngstown Sheet & Tube Co., Youngstown, succeeding **August G. Jacob** who retired June 30. Mr. Cleevely joined the company in 1904 and has held a number of positions, the most recent of which was foreman of crane repairs.

—o—

Berger Mfg. Division, Republic Steel Corp., Cleveland, has named **Robert N. Legg Jr.** as salesman in the Harrisburg, Pa., territory. Mr. Legg replaces **Howard Baum** who is moving to Canton, O., to be manager of office equipment sales.

—o—

M. E. Brooks, chief engineer, Massena works, Aluminum Co. of America, Massena, N. Y., will be transferred to the Pittsburgh office of the company as assistant chief mechanical engineer. Mr. Brooks will be succeeded as chief engineer by **T. J. Werner** who is now chief engineer at the New Kensington, Pa., works.

—o—

Arthur W. Pugsley has joined the executive staff of Trundle Engineering Co., Cleveland, as vice president and sales manager. Mr. Pugsley was president of Products Engineering Co., Atlanta, for the last two years and had previously been associated with North American Fiber Products Co., attaining the position of vice president and general manager.

OBITUARIES . . .

Harry B. Harper, 68, former vice president in charge of sales for Willys-Overland Motors Inc. and at one time general sales manager for Studebaker Corp., died of a heart attack in Toledo, Aug. 26. He started his career with Willys-Overland in 1911, left in 1922 to join Studebaker and returned to his original company to head sales.

—o—

H. William Kopf, an authority on automotive tooling and machining methods and equipment, and for many years Detroit district manager for Pratt & Whitney Division, Niles-Bement-Pond Co., died Aug. 13.

—o—

Mac Short, 51, vice president of Lockheed Aircraft Corp., Burbank, Calif., and former president of the Society of Automotive Engineers, died recently in Los Angeles. He had been a top ranking engineer in the automotive and aircraft industries for many years.

—o—

Howard J. Thompson, 60, for many years chief chemist with National Acme Co., Cleveland, died Aug. 22. During World War II he was engaged in the development of aluminum gears for war appliances.

—o—

Raymond E. Palmer, 57, United States Rubber Co. engineer and project manager at the Mexico City, Mexico, plant, died Aug. 26. For the past two years he has been project manager of construction on a plant addition.

—o—

Walter Winkel, 60, president of the Modine Mfg. Co., Racine, Wis., died Aug. 22. He had been with the company since 1920.

—o—

Herman Osswald, 85, founder of the V & O Press Co., Hudson, N. Y., died Aug. 21, in Claverack, N. Y. He had been retired for several years but was still a consultant to the company.

—o—

Hampden Evans Tener, 82, died Aug. 27, in Montclair, N. J. He was born in Ireland and began his work in this country with Oliver Bros. & Phillips in 1882. He was later associated with Continental Tube Works and Carnegie Steel Co., rising to the rank of junior partner with the latter firm. For a number of years prior to his semi-retirement several years ago, he was engaged in banking.

—o—

Harry C. Wiess, 61, chairman of the board of Humble Oil & Refining Co., an affiliate of Standard Oil Co. of New Jersey, died Aug. 26, in Houston, Tex. He had been Humble president until last May.

—o—

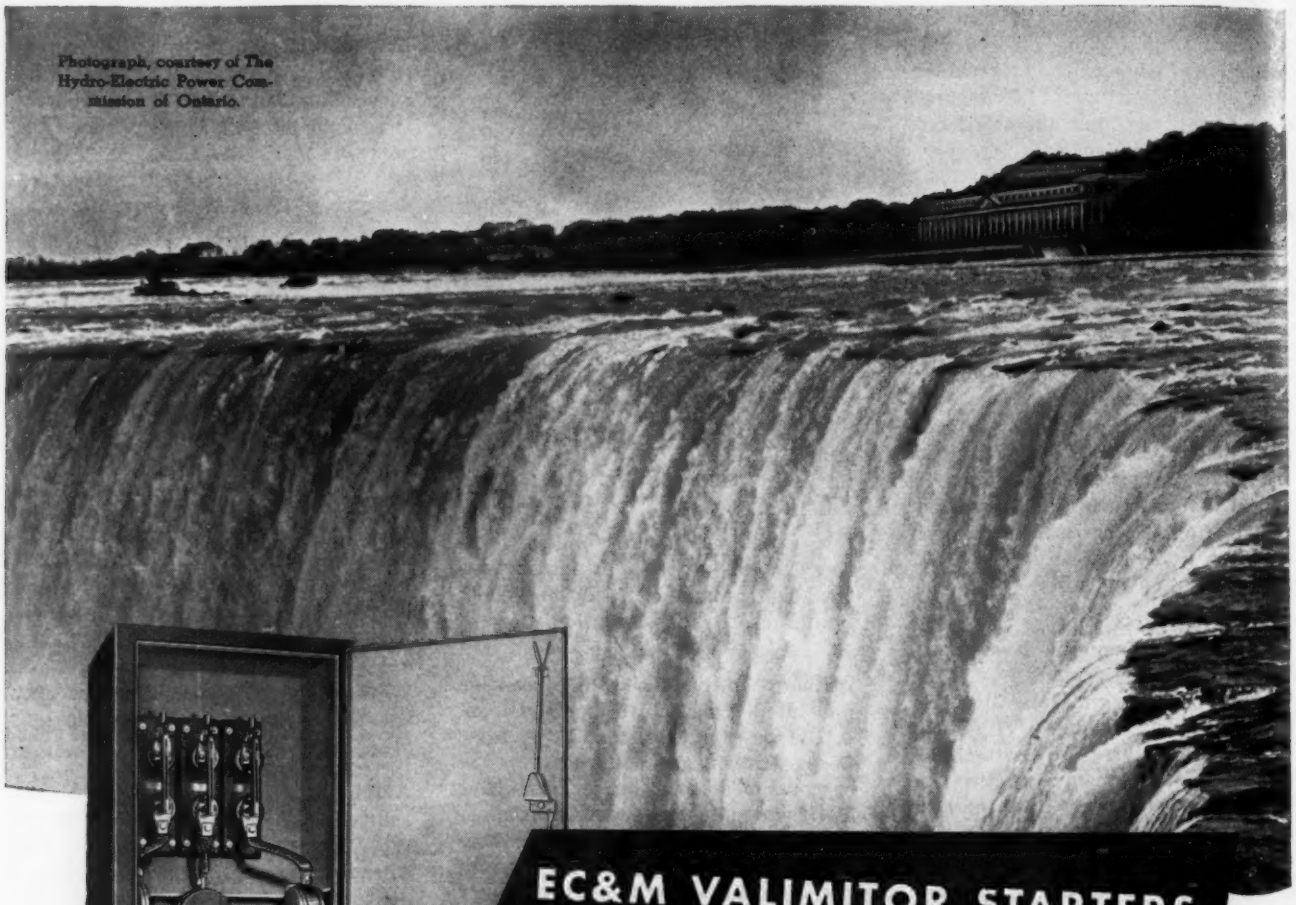
Wilbur C. Massow, assistant sales manager of Walsh Press & Die Co., division of American Gage & Machine Co., died recently in Chicago. He had been associated with Minster Press Co. before joining Walsh Press.

—o—

Frank Roberts, 32, superintendent of Inca Metal Products Co. Inc., Birmingham, died Aug. 26. He came to Birmingham in 1938 to work for American Cast Iron Pipe Co., later joining the metal company's staff.

—o—

Harry C. Cluley Jr., 53, general superintendent for Morris & Co., dealers in iron and steel, died Aug. 26, in Prospect Park, Pa.



Photograph, courtesy of The Hydro-Electric Power Commission of Ontario.

EC&M VALIMITOR STARTERS can be mounted Smack up to NIAGARA FALLS

VALIMITOR Starters are built for 2300 volt motors up to 600 hp. on 60-cycle systems; up to 300 hp. on 25-cycle service. Above 2300 volts and up to 4600 volts, starters are designed for motors up to 600 hp. at 60 cycles and up to 250 hp. for 25-cycle motors.

Complete Protection No Matter How Great the Available KVA.

No need to worry, now or at some future time, about the available KVA to which your 2300-4600 volt motor drives may be subjected. EC&M VALIMITOR Starters give *permanent* protection — *nothing* to replace—*no change* later on, even if present capacity is increased.

As the name VALIMITOR (volt-ampere-limitor) implies, these Starters are designed to limit the maximum possible fault current to 25,000 KVA (steady state), even when connected to a system having infinite available KVA. The well-known Type ZHS Magnetic Contactor, having 50,000 KVA interrupting capacity, is more than adequate for the interruption of such faults, including any initial, short-time transients. Because of inherent impedances of any system, the actual possible fault currents will be further restricted. Irrespective of this, however, the electro-magnetic forces and thermal effects under a fault condition are limited by VALIMITOR Starters to safe values.

EC&M VALIMITOR Starters can be applied without analyzing the system for maximum available KVA at the point of application. Simply tell us the HP, voltage, phase and frequency of your motors, and whether squirrel-cage, wound-rotor or synchronous type.

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Engineering News . . . AT A GLANCE

METAL WITH POSSIBILITIES— Titanium offers promising possibilities for applications in aircraft structures and engines where increasing quantities of special steels are being used, according to researchers of Remington Arms Co., Inc., Bridgeport, Conn. Findings indicate that the metal possesses a unique combination of strength, light weight and corrosion resistance. In many respects it is equivalent to stainless steel, but its weight for a given section is about 40 per cent less. It is found to melt at a temperature substantially above that of steel and 1900° F above aluminum. Also, its strength in the temperature range from 400 to 1000° F is higher than any aluminum or magnesium alloy.

SHORTCUTS ANALYTICAL JOB—First successful application of the mass-spectrometer to metals by William M. Hickam, a physicist with Westinghouse Electric Corp., Pittsburgh, is said to permit completing an analytical job that ordinarily would take days by chemical means in a few minutes. Use of the instrument was made possible by vaporizing metal samples in a small filament-type furnace. The new method detects as little as one part of the impurity per million by just employing samples in two milligram amounts. Setup was devised for a special research project and is not commercially available.

PUTS "SHINE" ON ALUMINUM— Aluminum now may be made as bright as mercury by means of a galvano-chemical process developed by Philadelphia Rust Proof Co., Philadelphia. At present, the company reports, the work is being done in its own plant on a jobbing basis until patents are granted, and certain technical difficulties are ironed out.

"PACKAGED" HANDLING— Total of six separate steps in the heat treating and quenching operations required to process stainless steel impeller blades in the plant of York Corp., York, Pa., are saved through use of a special fixture that is loaded in sections, picked up by an overhead crane and deposited as a unit in a vertical pit furnace. The fixture, developed by Driver-Harris Co., handles four work-carrying baskets, each with a rack to handle over a dozen impeller blades at once. Each sectional basket is loaded, then placed on top the other. When the four baskets are stacked, two holed flanges are fastened to the baskets by cast-in lifting knobs—presenting a complete package for the overhead crane to maneuver into the furnace.

ONE-OPERATION FABRICATING— In Chicago, Austenal Laboratories Inc. reports that there appear almost limitless applications in the metal industries for the Microcast process which provides precision "as-cast" parts possessing close tolerances, surface smoothness and sound structure. This is particularly true it is pointed out, in connection with parts of high melting point alloys subjected to extraordinary stresses and changes of temperature. In the process, parts are cast in accordance with a carefully developed foundry technique under accurately controlled conditions. The method lends itself most successfully to castings that vary in weight from a fraction of an inch to 1 pound on mass production basis. Length of castings currently is limited to 8 inches, depending on shape and contour of part. Tolerances may be held to 0.003-0.008-inch, plus or minus, depending on the form, mass and quantity.

TOOL FINISH IMPORTANT—Success of machining aluminum alloys depends to a large extent on tool finish, according to Floyd A. Lewis of the Aluminum Association. Too much emphasis, he points out, cannot be placed on the necessity of keeping cutting edges keen, smooth and free from grinding wheel scratches, burs or wire edges. Best results may be obtained by finish-grinding the cutting tools on a fine or very fine abrasive wheel, then resorting to fine or lapping. (p. 90)

CAUTION PREVENTS DENUDING—Polishing and buffing operation in connection with stainless-clad materials should be conducted along procedures recommended for stainless itself, L. W. Townsend, manager, composite steel division, Jessop Steel Co., points out. It is essential, he states, that iron-free abrasives be used and that the polishing and buffing be performed in such a way as to remove a minimum and uniform amount of metal over the cladding. (p. 95)

"PIERCES" INTERNAL FLAWS—X-ray method, if applied with the proper technique, should be more reliable than many other inspection methods because the effect of internal imperfections such as flaws, mosaic etc., can be eliminated. According to Norman P. Goss, consulting physicist, of Cold Metal Products Co., the density of crystals of the same substance, as a rule, vary considerably. Manner in which specimens are prepared appears to effect the density. Although the density of any specimen can be measured with great precision, its value may be in great error due to internal flaws—which accounts for wide variation in density determinations reported in literature. (p. 114)

"NIPPING" IDLE TIME—One of the important principles to remember, when designing any special manufacturing piece, is to have idle or nonproductive time as short as possible. To approach this objective, machining tools should be designed so that the workpiece can be located, fastened and removed from the tool in the shortest amount of time. Such quick-acting features on a tool not only increase percentage of production, but also result in a more desirable piece of equipment. (p. 122)

How to Machine and Finish Aluminum

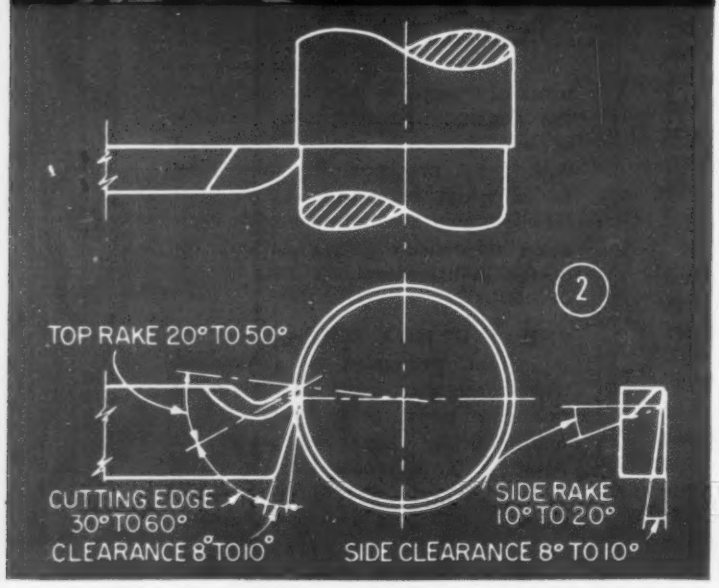

Fig. 1—Multiple drill head with automatic control drilling two holes at one time

Fig. 2—Lathe tool is set at or slightly above center

ALUMINUM alloy castings may readily be machined by means of standard machine shop equipment of the type used with other metals. In general, relatively high machine speeds give best results with most alloys; in fact, for many operations the speeds employed are the maximum possible speeds of which the machines are capable. Some alloys have better machining characteristics than others, and in some instances the use of special tools or practices is desirable for maximum production.

General machinability of most of the alloys may be predicted from a knowledge of the composition. Aluminum of commercial purity is soft, and chips from machining operations are inclined to be somewhat gummy. Alloying additions such as copper, zinc, and magnesium, which do not form extremely hard or abrasive constituents, usually improve the machinability. Alloys containing silicon or manganese are harder to machine, because these elements form hard abrasive constituents which increase tool wear. The mechanism by which the various alloying elements influence machinability is not clearly understood, and therefore most of the formation available is of an empirical nature.

A classification of the various commercial aluminum alloys by machinability is presented in Table I, alloys in class I having best machinability and those in class IV the poorest. This classification is at best only approximate, however, and variations may be found within the four classes.

Of the non-heat-treated alloys, those in classes I and II can be turned, milled and drilled at the highest speeds, feeds and cuts. Tools may have relatively small rake angles. Many operations may be performed with no lubricant, or with an inexpensive lubricant like a soluble oil. Alloys in group III machine best at lower feeds and cuts. Tools with larger rake angles and a good lubricant should be used to avoid any tendency toward burring or build-up of chips on the tool. Special care is sometimes required in machining alloys in group IV. Further reductions in feeds and cuts are necessary, and rake angles of tools should be increased still more to obtain smooth surfaces. Best results are obtained with tools of the carbide-tipped type. A good lubricant is desirable.

Similar comparisons may be drawn between the four classes of heat-treated alloys. Heat treatment at low temperatures improves machinability slightly. Precipitation treatment affects machining properties but little, except that the increased hardness results in higher tool wear. Alloy SN 41 may be machined

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Alloy Castings

Among the advantages of cast aluminum alloys is the ease with which they can be machined and finished. This characteristic can be most effectively exploited by following the author's practical advice

at high speeds using moderate feeds and cuts, but because of its abrasive nature the use of carbide-tipped tools is recommended.

Tools — Ordinary high-carbon steel tools perform satisfactorily in machining many aluminum alloys, particularly where speeds are relatively low because of machine limitations or for other reasons. For quantity production work, however, high-speed steel tools have largely replaced the high-carbon tools. In many instances tools tipped with cemented carbides have proved their worth, especially with alloys of high silicon content. When properly ground, the carbide-tipped tools produce excellent machined surfaces and remain sharp for long periods; hence they are particularly suitable for high production. The use of these tools, however, requires that the work be free of vibration and irregularities in the cut.

The following recommended practices represent the principal differences between aluminum and other metals with respect to tools and should be carefully followed for good results:

1. Grind more top and side rake than is common for machining steel.
2. Keep cutting edges sharp and free of burred or wire edges.
3. Maintain smooth, bright tool surfaces free from scratches.

As indicated in preceding paragraphs, rake angles may vary rather widely for the various alloys. In general, the larger rake angles are employed for finishing cuts and for alloys that are not free-cutting. Lower rake angles are used for rough cuts and for free-cutting alloys.

Top rake, or "hook," may vary from 20 to 50 degrees. Very smooth surfaces are obtained with a tool having a top rake in the upper portion of the range, but such a tool can be used only in machines that are sturdy, free from vibration, and with no lost motion in the feeding mechanism. Side rake is important in machining aluminum alloys, as this produces the slicing action that is especially effective in parting the cutting from the stock. Side rake of from 10 to 20 degrees usually is adequate, but planer and shaper tools for the finish cuts sometimes are ground with a side rake as high as 60 degrees.

A clearance of 8 to 10 degrees should be provided and carried around the side of the tool advancing into the work. The clearance angle is somewhat critical; if too small, the side of the tool may rub against the work and generate heat; if too large, the tool may dig into the work or chatter.

Tool Finish—As the success of machining aluminum alloys depends to a large extent on tool finish, too much emphasis cannot be placed on the necessity of keeping the cutting edges keen, smooth, and free from grinding wheel scratches, burs, or wire edges. Best results are obtained by finish-grinding the cutting tools on a fine or very fine abrasive wheel, then hand stoning with a fine or very fine hand stone, or lapping. Care must be exercised to maintain the required contour during these operations. If possible, carbide-tipped tools should be diamond lapped.

Lathe and planer tools ground according to the foregoing recommendations are illustrated in Figs. 2 and 4. The same lathe tool may be used for both rough and finish cuts, but restoning of the cutting edge is recommended before the finishing operation. Boring tools should have the same angles, but more clearance is required for small bores.

In planers and shapers, the inertia of the ram usually limits the operating speeds. As the work generally can be anchored securely, heavy feeds and cuts can be taken with a roughing tool such as that shown in Fig. 4a. When taking finish cuts with a tool of the type shown in Fig. 4b, however, only fine feeds may be employed.

Milling cutters for aluminum alloys should conform insofar as practical to the general recommendations for tool shapes. Teeth should be coarse and deeply cut to provide ample clearance for cuttings and should have both top and side rake. Spiral and helical tooth cutters should have teeth undercut to provide the needed top rake; the spiral and helix angles furnish the required side rake. The same principles apply also to other types of milling cutters of both the solid and inserted tooth types.

Threading—For threading, hand and machine taps of the ground-thread type are satisfactory for aluminum, provided the flutes are undercut to give "hook" to the leading edges. Flutes should be deep and wide to provide ample clearance for chips. Taps with straight flutes may be used, but spiral-fluted taps are better, especially for the softer alloys. Taps with a short spiral ground on the lead end also are

TABLE I
CLASSIFICATION OF COMMERCIAL ALUMINUM CASTING ALLOYS BY MACHINABILITY

Class*	Non-Heat-Treated Alloys	Heat-Treated Alloys
I	GS 1	CG 1
	GZ 1	CS 22
	ZG 41	
II	CS 21	C 1
	G 1	G 1
III	SC 1	CN 21
		CS 4
		CS 23
		SC 8
		SG 1
		SC 21
		SC 42
IV	S 1	SC 41
	S 2	SN 41

* Machinability is indicated Class Number, Class I being easiest to machine and Class IV hardest.

satisfactory for through holes or for blind holes deep enough for the chips to collect at the bottom. Thread chasers for both self-opening die heads and collapsible taps should be ground with suitable rakes, clearance, and chamfer. Excellent threads also may be cut on a lathe by using a single-pointed threading tool.

Standard drills and reamers as used for other metals are satisfactory also with aluminum. Better results in drilling are obtained, however, with drills having a larger spiral angle, especially for the softer materials. Flutes should be wide, deeply cut, and have a polished finish to provide ready egress of the chips. Thin material may be drilled dry, but a liberal quantity of cutting fluid should be used when drilling deep holes.

Cutting Speeds and Feeds—Although wide ranges of speeds and feeds may be employed in machining aluminum alloys, best results generally are obtained by operating the machines at their highest possible speeds with moderate feeds and cuts. Speeds, feeds and cuts applicable to most shops are indicated in Table II. For the higher speeds, it is important that the machines be sturdy, well balanced, and well anchored to minimize vibration. It is essential too that the machines be amply powered in order to handle the indicated loads satisfactorily.

Feed and depth of cut must be so related to cutter speed and number of teeth that each tooth takes a definite bite, as otherwise the effect may be to burnish the work and generate heat. Each blade should advance into the work at least 0.003-inch; in some instances an advance up to 0.015-inch has been employed. In milling, the depth and width of cut may be large and the feed may be many times faster than the ordinary machine is capable of handling.

Cutting Compounds — Free-cutting alloys such as those listed in classes I and II in Table I often are machined without cutting compound, especially roughing cuts. When heavy cuts and feeds produce excessive heat, a cutting compound should be used. When only a coolant is required, soda water or soluble oil generally is employed; a small amount of lard oil or kerosene sometimes is added. If lubrication as well as cooling is required, one of the ready-mixed cutting compounds is convenient to use; often these are blended with a low-viscosity mineral oil. Some shops use mixtures of kerosene and lard oil. With heavy cuts and slow feeds, high-viscosity compound should be used.

In high-speed machining with heavy feeds and cuts, the coolant must be supplied in large volume, literally submerging the work. A stream of compressed air sometimes is introduced with the coolant, and in some instances an air stream alone has been used successfully to cool and blow away the chips.

Salvage Cuttings—Since aluminum has a high scrap value, provisions should be made to salvage as much of the cuttings from machining operations as possible. These may be cleaned and prepared for remelting. The most effective handling of scrap material requires that cuttings as well as other types of scrap be carefully segregated by composition so that scrap may be remelted with metal that is of similar composition.

Fig. 3—Bridgeport die sinking machines in operation sinking small dies

Surface Finishes—Mechanical finishes applied by any of the well-known standard methods, such as polishing, buffing, or brushing, produce attractive surfaces on aluminum castings and excellently fulfill all the requirements of many applications. For some purposes electroplating may be desirable. Where colored surfaces are required a chemical or electrochemical finish with suitable dyes may be applied. Aluminum also lends itself admirably to the application of paints, lacquers, and enamels.

If high resistance to abrasion or corrosion is called for, anodic oxidation of the surface is the best treatment. The coatings thus produced may readily be impregnated with dyes of various colors for decorative purposes or with special agents to increase the resistance to corrosion. They also serve as excellent bases for paint or enamel.

Mechanical Finishes—Following the rough grinding and polishing, a variety of mechanical surface finishes may be applied to aluminum castings. These may serve either as the final surface finishes in themselves or as bases for additional finishes. The actual operations depend somewhat on the nature of the casting as well as on the desired finish.

A fine polishing operation usually follows rough polishing. Sometimes called greasing or oiling, this operation is a refinement of the rough polishing and is similar to it, except that a lubricant is used on the wheel. A felt or sheepskin wheel is used, faced with emery ranging in fineness from No. 100 to 220. The lubricant reduces the danger of burning; tallow, oil, beeswax, or tallow compositions commonly are employed.

When it is desired to bring out a high surface luster, the polishing operations are followed by buffing. This differs from polishing in that the abrasive is embedded in a grease binder and is rubbed on instead of being glued to the wheel. Tripoli powder is the most common buffing agent; for convenient use it may be mixed with grease and the mixture molded in cake form, which is applied by simply holding the cake against the revolving wheel.

TABLE II

RECOMMENDED CUTS, SPEEDS, AND FEEDS WHEN MACHINING ALUMINUM ALLOYS

	Rough Machining			Finish Machining		
Operation†	Maximum Cut Inches	Speed Feet per Minute	Feed, Inches	Cut, Inches	Speed Feet per Minute	Feed, Inches
LATHE TURNING						
Class I alloys, not heat treated ..	0.25(a)	500 to 900	0.020 to 0.030	0.002 to 0.010	Maximum	0.002 to 0.010
All Others	0.19(a)	400 to 800	0.007 to 0.020	0.002 to 0.010	600 to 900	0.002 to 0.010
MILLING						
Class I alloys, not heat treated ...	0.25	400 to 600(b) 500 to 700(c) Maximum(d)	5 to 15(e)	0.010 to 0.020	500 to 700(b) 500 to 700(c) Maximum(d)	10 to 25(e)
Class I alloys, heat-treated Class II and III alloys	0.25	400 to 600(b) 500 to 700(c) Maximum(d)	4 to 10(e)	0.010 to 0.020	500 to 700(b) 500 to 700(c) Maximum(d)	5 to 15(e)
Class IV alloys	0.25	300 to 500(b)	3 to 8(e)	0.010 to 0.020	500 to 700(b)	4 to 10(e)
BORING						
Light duty (1 to 2 inch)	0.09(a)	Maximum(f)	0.010 to 0.020	0.010 to 0.020(a)	Maximum(f)	0.001 to 0.005
Medium to heavy duty	0.25(a)	600 to 1000	0.007 to 0.015	0.010 to 0.020(a)	600 to 1000	0.001 to 0.003
SHAPING						
Heavy duty (36 inch)	0.25	Maximum(g)	0.010 to 0.030	0.005 to 0.010	Maximum(g)	0.100 to 0.150
PLANING	0.38	Maximum(h)	0.025 to 0.100	0.005 to 0.015	Maximum(h)	0.050 to 0.375

† See Table I for explanation of Class numbers listed above in first column.

(a) Cut measured on radius.
(b) For carbon steel tools.
(c) For high-speed steel tools.
(d) For cemented carbide tools.
(e) Travel of work.
(f) Peripheral speed of tool is maximum of most machines.
(g) Travel of ram.
(h) Speed of table.

Buffing wheels must be properly selected, and abrasive of the proper fineness must be used for best results with aluminum. Hard buffs have better cutting qualities than soft ones, but have greater tendencies to form pits or streaks. If these difficulties are experienced a softer buff should be used. More lubricant is required for buffing aluminum than for harder metals, and generally lower pressures against the buff. Experience is the best guide to the proper equipment and technique for the desired result.

Final polishing operation is known as coloring, which actually does not change the color of aluminum, but produces a characteristic high gloss. Cleaning in benzene and drying in sawdust precedes the operation. Castings sometimes are also given a light caustic etch between buffing and coloring, especially if an anodic oxide coating is to be applied later. Wheels for coloring are usually muslin or flannel, similar to soft buffs, and the abrasive soft silica mixed with grease.

Sandblasting—Sandblasting provides an excellent means of cleaning aluminum castings and at the same time imparting a uniform matte surface of pleasing appearance. Surface discoloration, minor surface roughness from rough grinding operations can readily be removed or masked by this method. Hence this treatment often follows the rough grinding or polishing operation, instead of the polishing and buffing procedures. In addition, any unsoundness just below the surface usually is revealed by blasting, which makes the method valuable from the standpoint of final inspection.

Sand of various sizes, dust, steelgrit, or shot may be used in blasting treatments, depending on the desired surface. Dust, of course, will give a smoother surface than sand, but steelgrit is advantageous from the operator's standpoint because the absence of dust improves visibility during the operation. Shot blasting produces a peened type of surface and is particularly effective in removing burs.

Because of its roughness, a plain sandblasted surface fingerprints easily and collects and retains dirt. Therefore, a coat of lacquer or clear varnish sometimes is applied to aid in keeping such surfaces clean. In addition, sandblasting treatments often are followed by anodic oxidation finishes.

Equipment for blasting operations is much the same for aluminum as for other metals. It consists essentially of a closed chamber fitted with an exhaust system and a hose for the blast. The chamber may be equipped with some means of conveying the work before the operator or past the automatic blasting machinery. The abrasive may be introduced into the column of compressed air by gravity, suction, or mixing directly under pressure. The workman should be properly protected.

Four principal factors determine the texture of the sandblasted surface: (1) Air pressure; (2) rate of size; (3) grade of sand or abrasive; and (4) distance introducing sand, which is influenced also by nozzle and angle between nozzle and work. The best relationships for any given casting are determined experimentally, and once chosen for a given casting must be adhered to so that a uniform finish is obtained.

Highlighted Finish—By applying one type of finish to the raised portions of a casting and a different finish to the recesses, a highly attractive effect is obtained. This is known as a highlighted finish, and it is particularly well adapted to spandrels and other decorative castings. Raised areas are highly polished by buffing or coloring, and recesses are usually sandblasted.

Raised areas are protected by some sort of adhesive covering while the background is sandblasted. If anodic oxide treatment is to follow, the casting is next given a caustic treatment to provide a light etch on the background. The background then is protected by adhesive covering or by painting while the highlights are buffed. Anodic oxide treatment which provides permanent protection to the entire casting follows as the final operation. Pigments or dyes may be added during this process if a colored surface is desired.

Scratchbrushing and Satin Finishes—By application of a rotating wire brush to aluminum castings,

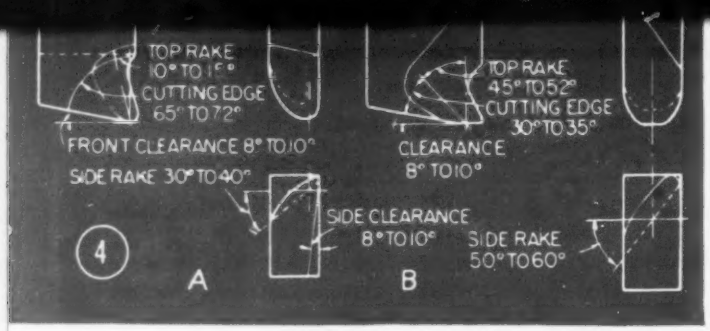

Fig. 4—(A) Planer tool for roughing cuts; (B) planer tool for finishing cuts

a coarse-lined surface is obtained. Fineness of the finish is determined by the size of wires in the brushes, wire of 0.015-inch diameter commonly being used. This type of finish usually is applied after sandblasting.

Satin finish is similar to scratchbrushing except that a finer brush or abrasives are used. Wires from 0.002 to 0.005-inch in diameter are most often used, and a variety of effects can be obtained by varying the angle of contact of the brush. Satin finish is applied to castings following a buffing or coloring treatment. A very fine satin finish may be obtained by the use of a fiber brush or by hand rubbing with a paste of pumice and oil.

Chemical Finishes—Surface effects not possible by mechanical means may be produced chemically, usually at lower cost. Decorative coatings resistant to corrosion, but not particularly resistant to abrasion, can be produced in this manner. These finishes include frosted and diffused reflector finishes, chemical etching, and the Alrok finishes (patented finishes developed by Aluminum Co. of America).

Frosted finish is produced by first treating in a caustic solution, followed by rinsing, and immersion in an acid solution. Parts are then rinsed again and dried on a steam table. The Alrok finishes are both decorative and protective and may be colored by a variety of dyes. They are less resistant to corrosion and abrasion than anodic oxide coatings, but cost less. Both frosted and Alrok finishes are especially adapted to the treatment of small castings and are not used extensively for larger parts. The other chemical finishes mentioned are applied mostly to wrought aluminum products.

Electrochemical Finishes—Oxide coatings applied to aluminum surfaces by anodic treatment are perhaps the most versatile of all the various types of finishes available. They are resistant to atmospheric corrosion, wear and chemical attack. They may be impregnated with a variety of dyes or pigments to provide a variety of colors. They form an excellent base for paint, lacquer, or enamel. They have a hard smooth surface that does not collect dust.

Like electroplating, the method involves treating the parts in an electrolyte. Unlike electroplating, however, the parts being treated are connected to the anode of the electric circuit instead of the cathode. Passage of the current through the electrolyte thus deposits oxygen on the parts being treated instead of a metal as in plating. The oxygen attacks the aluminum surface, producing an oxide coating of increased thickness integral with surface of the metal.

Thickness and other characteristics of the coatings may be varied over a wide range. The coatings as formed may be clear, translucent, or opaque. Some alloying elements confer characteristic colors on the coatings, generally gray or brown tints. The coatings reproduce the texture of the surface on which they are formed; they will thus preserve the appearance of the various mechanical finishes when applied after those finishes.

As initially formed, the oxide coating is filled with fine pores, too small to be seen with the naked eye. Because of their porous nature, the coatings thus will absorb a number of agents which impart to them a variety of properties. Sealing treatments make the coatings resistant to staining. Corrosion inhibitors such as chromates increase the corrosion resistance. Dyes and pigments may be absorbed during certain stages of the process to provide a variety of colors. Corrosion inhibitors usually are employed when the coatings are to serve as a base for either paint or enamel.

Perhaps the most thoroughly developed finishes of this type are those applied by the Alumilite process, developed and patented by Aluminum Co. of America.

Electroplating—Unlike other metals, aluminum seldom is electroplated for protection; but it often is plated to produce an attractive finish or one having higher resistance to wear. Chromium, nickel, copper, brass, silver, gold, and oxidized modifications of these elements all may be applied to aluminum. Silver is applied to electrical equipment to decrease contact resistance, or to improve surface conductivity. Brass facilitates vulcanization of rubber. Copper permits assembly by soft soldering. Heavy chromium deposits reduce friction and increase wear resistance. Chromium applied directly provides considerable resistance to alkali corrosion. Zinc also increases corrosion resistance under some conditions.

The "zinc immersion" process is the one most generally used in plating aluminum, and the required equipment is about the same as that used for plating on other base metals. In this process a coating of zinc is formed chemically on the aluminum surface and this serves as a bond for other deposits. The most common plated finish comprises successive deposits of copper, nickel, and chromium. Brass, iron, silver, or chromium may also be applied directly over the zinc coating. When properly applied, these coatings will not blister when heated, and their adherence exceeds the cohesive strength of the base metal.

Other plating methods start with a porous anodic coating as a base. Zinc may also be deposited directly on aluminum from a standard cyanide solution. Because of the unfavorable solution potential of aluminum with respect to plating metals, plated aluminum should not be used in a corrosive environment unless the coating is heavy enough to be impervious—about 0.0015 inch of nickel.

Paint, Lacquer, Enamel—In many instances the use of paint, lacquer, or enamel constitutes the most economical means of obtaining the desired decorative effect; in others it is necessary for protective purposes. When paint is to be used only for decoration, very little surface prepara- (*Please turn to Page* 142)

DIVERSIFIED APPLICATIONS OF

Stainless Clad Steel

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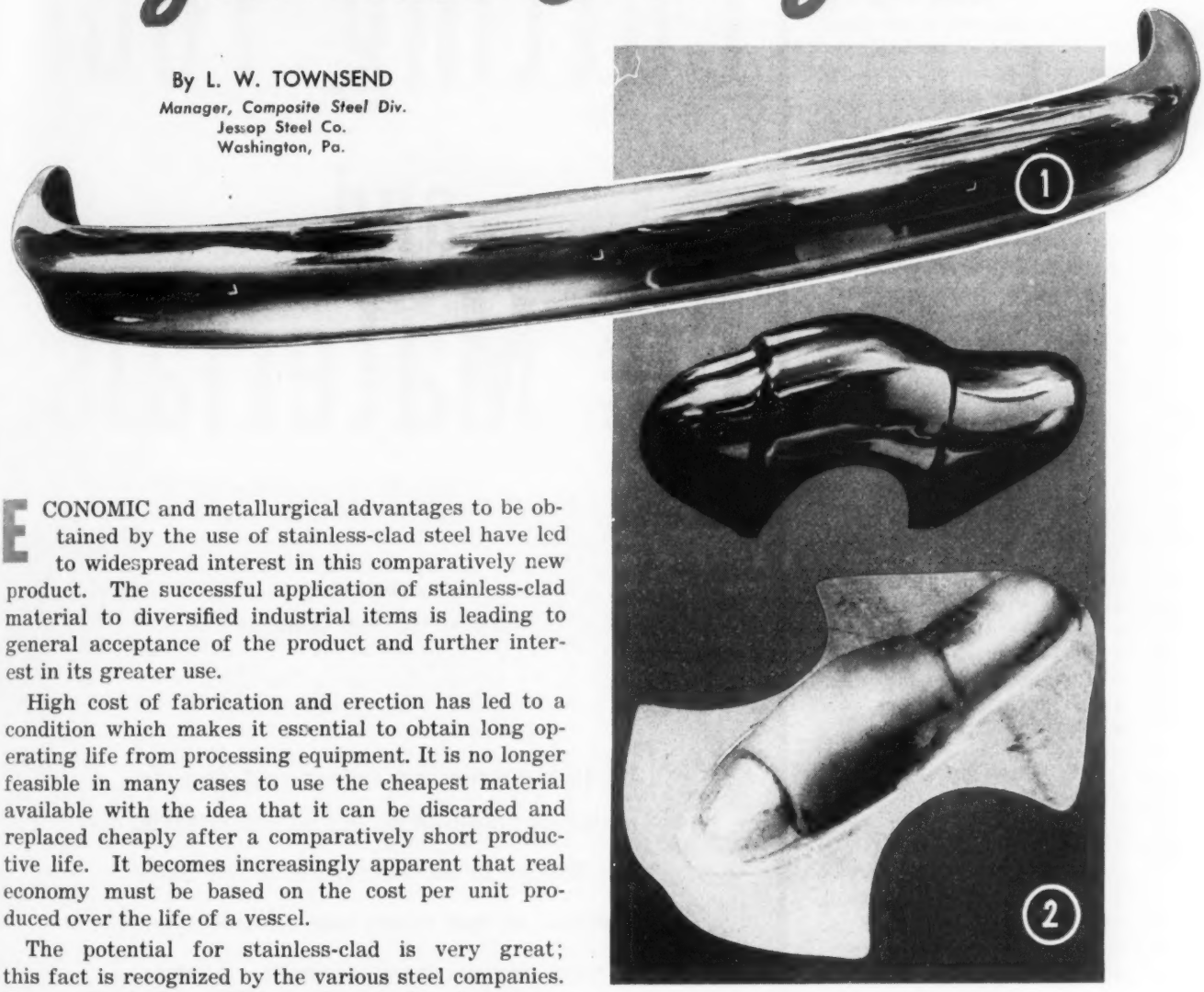


ECONOMIC and metallurgical advantages to be obtained by the use of stainless-clad steel have led to widespread interest in this comparatively new product. The successful application of stainless-clad material to diversified industrial items is leading to general acceptance of the product and further interest in its greater use.

High cost of fabrication and erection has led to a condition which makes it essential to obtain long operating life from processing equipment. It is no longer feasible in many cases to use the cheapest material available with the idea that it can be discarded and replaced cheaply after a comparatively short productive life. It becomes increasingly apparent that real economy must be based on the cost per unit produced over the life of a vessel.

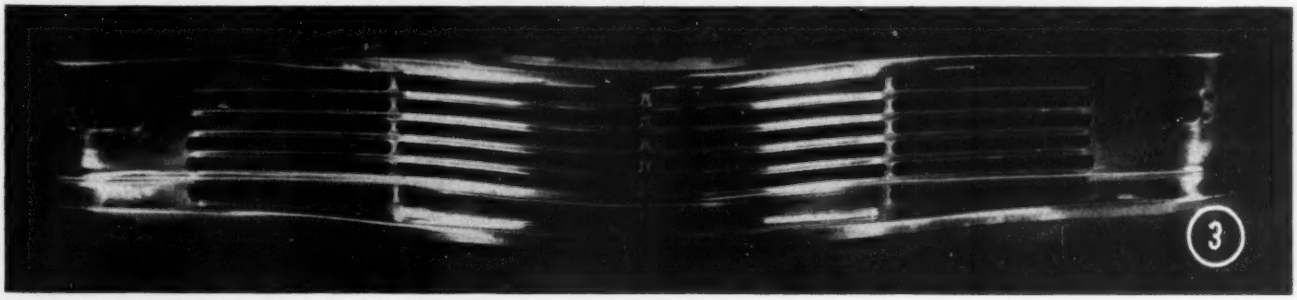
The potential for stainless-clad is very great; this fact is recognized by the various steel companies. Jessop Steel Co., which perfected the Armstrong method of processing, recently consummated working agreements with Alan Wood Steel Co., Conshohocken, Pa., for the tonnage production of Permaclad sheet, and with Worth Steel Co., Claymont, Del., for the manufacture of Ferro Bond plate.

Stainless-clad plate material is produced using various grades of backing steel so as to obtain tensile strengths in a range of 50,000 to 75,000 pounds per square inch. Fabrication of stainless-clad plate is

Fig. 1—Stainless-clad automobile bumper sections are cold-formed in pairs on camel-back forming setup and polished on conventional bumper polishing line

Fig. 2—Bumper guard of 13 gage 20 per cent stainless clad steel cold formed in two operations with no heat treatment

Fig. 3—This stainless-clad automobile grille has deep drawing steel backing, cold drawn without intermediate anneal in six operations



fairly simple; satisfactory welding techniques are in use and standard shop practices set up so that stainless-clad work is accepted and performed without hesitation or confusion. The number of fabricators experienced in the use of the product is very large; no difficulty is encountered in securing a source for stainless-clad fabrication or erection.

Success with which stainless-clad plate material was adapted to various uses is of great interest to sheet metal users and designers. Limitations of the presently available methods of obtaining proper corrosion resistance and appearance for ornamental items and those requiring a combination of ornamentation and utility have long been recognized. By making large tonnages of stainless-clad sheet material commercially available a real need in applications such as food processing, appliances, automobiles, transportation and architecture will be filled.

Stainless-clad material may be made so as to meet the physicals of low alloy high tensile steel as well as low carbon deep drawing stock. With this range of physical properties, and with the knowledge that various types of stainless and rustless irons can be used as the cladding, engineers and designers may now proceed with confidence in designing light gage sections to be made of this material.

A good start has been made in developing this versatile material in various sheet applications. Difficulty was encountered in the early stages of the work when the material was treated and drawn in dies, following the same procedure and using the same drawing compounds as those used in the forming and drawing high tensile or deep drawing steel. The stainless steel had a tendency to develop die pick up and resulted in die marks to the extent that subsequent polishing and buffing operations were excessively expensive.

Experience gained thus far indicates that the most economical and best results can be obtained where a procedure designed for the product is followed. Grinding of the blank in the flat, prior to drawing, to an intermediate finish has proved advantageous in many instances. After grinding to an intermediate finish, a mar-proof coating should be applied to the stainless surface. There are a variety of these coatings available, some of which furnish the necessary die lubrication and others which may be used together with a liquid die lubricant. The exact procedure with regard to die lubrica-

(*Please turn to Page* 124)

Cutting Tool and Die Materials

FOURTH OF A SEVEN SECTION SERIES

This information on cutting tool and die materials prepared by the editors of STEEL lists factors to be considered in the quick selection of tool steels and carbide types to meet any given requirement. Sources, trade names and applications are conveniently presented. Other pertinent data include chemical analyses, heat treatments, quenching media, movement in hardening and machinability as annealed

Previous data on tool and die materials appeared in the following issues: p. 98, Aug. 16, 1948; p. 82, Aug. 23, 1948; p. 64, Aug. 30, 1948

HENRY DISSTON & SONS INC., Unruh & Milnor Sts., Philadelphia 35, Pa. — Listing No. 19

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	SUGGESTED TEMPERATURE RANGES (°F)						Quenching Medium. ★ % Machinability Annealed. Movement in Hardening.
			Forging	Finish Forging	Annealing	Preheating	Hardening	Tempering	
Cold Work Dies	NICROMAN Oil Hardening	C .70, Mn .45, Cr 1.00, Si .20, Ni 1.65	1750–1950	1600	1425	....	1550	375–450	Oil Mach. 80 Movement A
Cold Work Dies (Blanking, Cold Forming)	BEST CARBON Water Hardening	C as ord., Mn .20, Si .20	1950	1700	1400	....	1450	325–400	Water Mach. 100 Movement B
Cold Work Dies (Blanking, Cold Forming)	CROLOY Oil Hardening	C 1.50, Mn .30, Cr 12.00, Mo .80, V .95, Si .30	1900–2050	1700	1625	1350	1850	300–1000	Oil Mach. 60 Movement A
Cold Work Dies (Blanking, Cold Forming)	D-9-Mo Water Hardening	C 1.15, Mn .60, Mo .20, Si .50	2150	1700	1400	....	1440	212–400	Water Mach. 95 Movement A
Cold Work Dies (Blanking, Cold Forming)	D-9-Va Water, Oil Hardening	C 1.15, Mn .60, V .20, Si .60	1950	1700	1400	....	1575–1475	212–400	Oil, Water Mach. 95 Movement A
Cold Work Dies (Blanking, Cold Forming)	MANSIL Oil Hardening	C .90, Mn 1.15, Cr .50, W .50, Si .35	1900	1450	1400	1150	1475	380–425	Oil Mach. 85 Movement A
Cold Work Dies (Blanking, Cold Forming)	VA-TOOL Water Hardening	C .95, Mn .25, Cr .15, V .25, Si .20	1700–1800	1600	1400	....	1450	325–450	Water Mach. 95 Movement A
Cutting Tools	(See D-9-MO, D-9-VA, Listed Above)								
Cutting Tools (Finishing)	CELERO Water Hardening	C 1.35, Mn .25, Cr .25, W 2.75, Si .20	1900	1650	1450	....	1575	200–700	Water Mach. 90 Movement B
Cutting Tools (Finishing)	D-6-CO Oil Hardening	C .75, Mn .25, Cr 4.00, W 18.25, Mo .65, V 2.00, Co 5.75, Si .20	1900–2100	1650	1650	1650	2375	1080 twice	Oil Mach. 55 Movement B
Cutting Tools (Finishing)	NIVAN Oil Hardening	C .90, Mn .30, Cr .40, V .20, Si .25, Ni 1.35	2100	1700	1400	....	1525	400–600	Oil Mach. 90 Movement A
Cutting Tools (Finishing)	No. 98 Oil Hardening	C .40-.50, Mn .20-.30, Cr 8.60, Mo 1.90, Si 1.00, Cu 2.00	2050	1700	1500	....	1850	450 950	Oil Mach. 75 Movement C
Cutting Tools (Finishing)	No. 844 Oil Hardening	C .85, Mn .30, Cr .80, Si .25	2150	1700	1400	....	1525	300–550	Oil Mach. 80 Movement B
Cutting Tools (Finishing, Grass, Leather, etc.)	No. 871 Oil Hardening	C .55, Mn .65, Mo .20, Si .20	2150	1650	1370	....	1525	800	Oil Mach. 90 Movement B
Cutting Tools (Finishing, Wood, Plastic)	POLARIS Oil Hardening	C .85, Mn .30, Cr .15, Si .25, Ni .70	2150	1700	1360	....	1550	400–600	Oil Mach. 100 Movement A
Cutting Tools (Finishing)	SEMI HI-SPEED Oil Hardening	C 1.10, Mn .25, Cr .30, W 1.15, V .20, Si .15	2150	1700	1450	....	1575	360–425	Oil Mach. 85 Movement B
Cutting Tools (Finishing)	TUNGSTEN HACK Oil Hardening	C .90, Mn .20, W 1.00, V .15, Si .15	2150	1700	1450	....	1500	380	Oil Mach. 85 Movement B
Cutting Tools (Roughing, Finishing)	DI-MOL Oil Hardening	C .80, Mn .25, Cr 4.00, W 1.55, Mo 8.50, V 1.15, Si .25	1900–1950	1700	1600	1575	2200	1050	Oil Mach. 65 Movement A
Cutting Tools (Roughing, Finishing)	KUTKWIK Oil Hardening	C .75, Mn .25, Cr 4.00, W 18.25, Mo .80, V 1.10, Si .25	1900–2000	1600	1600	1675	2325	1050	Oil Mach. 60 Movement A
Cutting Tools (Roughing, Finishing)	6N6-M2 Oil Hardening	C .82, Mn .25, Cr 4.25, W 6.35, Mo 5.00, V 1.90, Si .35	1900–2100	1650	1550	1700	2225	1050	Oil Mach. 65 Movement A
Die Casting	No. 98	(Listed Above)							
Die Casting Dies	No. 872 Oil Hardening	C .35, Mn .30, Cr 3.25, W 9.25, V .30, Si .35	2025	1650	1600	1550	2175	800–1100	Oil Mach. 80 Movement A
Hot Work Dies (Punching, Shearing, Forming)	No. 873 Oil Hardening	C .38, Mn .35, Cr 5.00, W 1.25, Mo 1.35, V .40, Si 1.00	2050	1650	1475	....	1850	800–1100	Oil Mach. 85 Movement A
Hot Work Dies (Forming)	KEYSTONE Oil Hardening	C .50, Mn .30, Cr 1.10, W 2.00, V .20, Si .20	1800–1900	1475	1440	....	1640	375	Oil Mach. 85 Movement B
Hot Work Dies (Punching, Shearing, Forming)	H. R. W. Oil Hardening	C 1.00, Mn .25, Cr 3.75, V .15, Si .30	1750–1850	1500	1450	....	1750	1000	Oil Mach. 80 Movement B
Hot Work Dies (Forming)	No. 872	(Listed Above)							
Hot Work Dies (Punching, Shearing)	No. 98	(Listed Above)							
Plastic Molding Dies (Hubs)	CROLOY	(Listed Above)							
Plastic Molding Dies (Hubbed Cavity Dies)	PLASTALLOY Water Hardening	C .10 Max., Mn .45, Cr .50, Si .20 Max., Ni 1.20	2200	1700	1475	....	1450	300	Water Mach. 95 Movement B
Plastic Molding Dies (Hubbed Cavity Dies)	PLASTIRON Water Hardening	C .10 Max., Mn .15, Si .20 Max.	2200	1700	1700	....	1450	300	Water Mach. 95 Movement B
Punching, Shearing	EXTRA CARBON Water Hardening	C 1.00, Mn .20, Si .20	1950	1700	1400	....	1450	325–400	Water Mach. 100 Movement B
Punching, Shearing	STANDARD Water Hardening	C 1.00, Mn .20, Si .20	1950	1700	1400	....	1450	325–400	Water Mach. 100 Movement B
Punching, Shearing	812 DIE Oil Hardening	C 1.80, Mn .30, Cr 12.25, Si .25	1900–2000	1650	1625	....	1800	212–400	Oil Mach. 50 Movement A
Punching, Shearing	(See BEST CARBON, CROLOY, MANSIL, NICROMAN, Listed Above)								

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	SUGGESTED TEMPERATURE RANGES (°F)						Quenching Medium. ★ % Machinability Annealed. Movement in Hardening.
			Forging	Finish Forging	Annealing	Preheating	Hardening	Tempering	
Shock Resisting (Repeated Impact)	D29 Oil Hardening	C .55, Mn .80, Mo .40, Si 1.35	1800–1900	1475	1450	....	1625	300–450	Oil Mach. 80 Movement B
Shock Resisting (Repeated Impact)	KEYSTONE (Listed Above)								

FAITOUTE IRON & STEEL CO. INC., 182 Frelinghuysen Ave., Newark 5, N. J. — Listing No. 20

Cold Work Dies	FISCO CARBON Water Hardening	C 1.05, Mn .25, Si .24	1850	1475	1400	....	1425	300–650	Water Movement C
Cold Work Dies	FISCO CHROMDIE Oil, Air Hardening	C 1.60, Mn .28, Cr 12.00, Mo .85, V .23, Si .38	1925	1700	1650	1200	1850	400–825	Air Movement A
Cold Work Dies	FISCO OILHARD Oil Hardening	C .90, Mn 1.15, Cr .50, W .50, V .20, Si .30	1900	1500	1450	1200	1475	300–450	Oil Movement A
Cold Work Dies	FISCO SPECIAL Water Hardening	C 1.05, Mn .25, Si .24	1850	1475	1400	....	1425	300–650	Water Movement C
Cutting Tools	FISCO HIGH SPEED High Speed	C .72, Mn .28, Cr 4.00, W 18.00, V 1.00, Si .22	2100	1800	1650	1600	2350	1050	Oil Movement B
Cutting Tools	(See FISCO CARBON, FISCO SPECIAL, Listed Above)								
Shock Resisting (Intermittent Impact)	FISCO DUPLEX Water Hardening	C .95, Mn .25, Si .25	1850	1475	1400	....	1425	300–650	Water Movement C
Shock Resisting (Repeated Impact)	FISCO OMEGA Water, Oil Hardening	C .55, Mn .80, Mo .50, V .25, Si 2.30	1900	1650	1450	1200	1625	400–650	Oil Movement B

A. FINKL & SONS CO., 2011 Southport Ave., Chicago 14, Ill. — Listing No. 21

Hot Work Dies (Hot Forgings)	F Water Hardening	C, Mn	2200	1800	1450	....	1400	750–1150	Water Movement B
Hot Work Dies (Hot Forming)	CUPRODIE	Cr, Mo, Cn, Ni	Furnished in heat treated conditions only: Temper H, 477/444 BHN; Temper 1, 429/388 BHN; Temper 2, 375/341 BHN; Temper 3, 331/302 BHN; Temper 4, 293/269 BHN						
Hot Work Dies (Hot Forming)	DURODI Oil, Air Hardening	Cr, Mo, Si, Ni	2200	1850	1425	....	1675	700–1150	Oil, Air Blast Movement A
			Also furnished: Temper 1, 429/388 BHN; Temper 2, 375/341 BHN						
Hot Work Dies (Hot Forming)	FS	Cr, Mo, Ni	Sold Annealed						
Hot Work Dies (Hot Forming)	FX	Cr, Mo, Ni	Furnished in heat treated conditions only: Temper 1, 429/388 BHN; Temper 2, 375/341 BHN; Temper 3, 331/302 BHN; Temper 4, 293/269 BHN						
Hot Work Dies (Hot Forming)	SHELLDIE Oil, Air Hardening	Cr, Mo, Si	2200	1850	1650	....	1850	900–1200	Oil, Air Blast Movement A
			Also Furnished: Temper 1, 429/388 BHN; Temper 2, 375/341 BHN						
Punching, Shearing (Cold, Hot Trimming)	COLD HOT Water, Oil Hardening	Cr, Mo	2150	1800	1460	....	1550	300–1000	Oil, Water Movement A

FIRTH STERLING STEEL & CARBIDE CORP., 2201-3299 Demmler Rd., McKeesport, Pa. — Listing No. 22

Boring Tool (Hardest Material)	FIRTHITE HF, Carbides	WC 97, Co 3							
Boring Tool (High Speed)	FIRTHITE T31, Carbides	WC 67, Co 8, Ti 25							
Cold Work Dies	AIRVAN Air Hardening	C 1.00, Mn .65, Cr 5.25, Mo 1.15, V .30, Si .35	1950	1650	1620	1400	1800	450	Air, Oil Mach. 70 Movement A
Cold Work Dies	A.W. SPECIAL Water, Oil Hardening	C 1.00, Mn .20, Cr 1.40, V .20, Si .25	1800	1550	1450	1200	1450–1550	375	Water, Oil Mach. 85 Movement A
Cold Work Dies	BLUE CHIP High Speed	C .72, Mn .25, Cr 4.10, W 18.20, V 1.15, Si .30	2100	1750	1650	1500	2350	1050	Oil, Air Mach. 55 Movement A
Cold Work Dies	CIRCLE C High Speed	C .76, Mn .25, Cr 4.75, W 18.50, Mo 1.00, V 2.00, Co 9.00, Si .25	2100	1800	1675	1500	2375	1000	Oil, Air Mach. 40 Movement A
Cold Work Dies	CROMOVAN DIE Air Hardening	C 1.55, Cr 12.00, Mo .95, V .90	1970	1700	1650	1400	1850	450	Air, Oil Mach. 45 Movement A
Cold Work Dies	FS1-5 High Speed	C .75, Mn .25, Cr 4.00, W 18.00, Mo .75, V 1.15, Co 5.00, Si .30	2100	1800	1625	1500	2375	1050	Oil, Air Mach. 50 Movement A

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement—"+" denotes expansion, "—" denotes contraction.

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement—"+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	SUGGESTED TEMPERATURE RANGES (°F)						Quenching Medium; ★ % Machinability Annealed. Movement in Hardening.
			Forging	Finish Forging	Annealing	Preheating	Hardening	Tempering	
Cold Work Dies	FS2-5 High Speed	C .80, Mn .25, Cr 4.00, W 14.00, Mo .75, V 2.00, Co 5.25, Si .30	2050	1800	1625	1500	2350	1050	Oil, Air Mach. 45 Movement A
Cold Work Dies	HI-MO High Speed	C .80, Mn .25, Cr 3.95, W 1.80, Mo 8.50, V 1.20, Si .30	2000	1700	1500	1400	2200	1025	Oil, Air Mach. 60 Movement A
Cold Work Dies	HI-MO-V High Speed	C .85, Mn .25, Cr 4.25, W .00, Mo 8.25, V 1.90, Si .25	1950	1700	1550	1400	2225	1025	Oil, Air Mach. 60 Movement A
Cold Work Dies	H.V. BLUE CHIP High Speed	C .83, Mn .25, Cr 4.00, W 18.50, Mo .75, V 2.10, Si .30	2050	1800	1625	1500	2375	1050	Oil, Air Mach. 45 Movement A
Cold Work Dies	INVARO Oil Hardening	C .90, Mn 1.15, Cr .50, W .50, V .20	1800	1500	1470	1200	1475	400	Oil Mach. 90 Movement A
Cold Work Dies	METEOR Water, Oil Hardening	C 1.20, Mn .30, Cr .25, W 1.50, V .15	1850	1550	1525	1150	1525–1575	375	Water, Oil Mach. 85 Movement A
Cold Work Dies	MO CHIP High Speed	C .59, Mn .25, Cr 5.00, W .00, Mo 8.00, V 1.25, Co 2.50, Si .25, B .25	1950	1750	1550	1400	2050	1025	Oil, Air Mach. 55 Movement A
Cold Work Dies	NITRARD No. 1 Air Hardening	C 1.55, Cr 12.00, Mo .95, V .90	1950	1700	1650	1400	1850	975	Oil, Air Mach. 45 Movement A
Cold Work Dies	SILVER DIE No. 1 Water Hardening	C .95, Mn .28, Cr .05, V .12, Si .20	1750	1500	1400	1200	1450	450	Brine, Water Mach. 100 Movement C
Cold Work Dies	SILVER DIE No. 2 Water Hardening	C .95, Mn .45, Si .45	1800	1500	1400	1200	1460	450	Brine, Water Mach. 100 Movement C
Cold Work Dies	STAR BLUE CHIP High Speed	C .73, Mn .25, Cr 4.75, W 14.00, V 1.65, Si .25	2050	1800	1600	1500	2300	1050	Oil, Air Mach. 55 Movement A
Cold Work Dies	STAR-MO M2 High Speed	C .82, Mn .25, Cr 4.15, W 6.20, Mo 5.00, V 1.90, Si .25	2000	1700	1550	1450	2200	1025	Oil, Air Mach. 55 Movement A
Cold Work Dies	SUPER HI-MO High Speed	C .80, Mn .25, Cr 3.95, W 1.80, Mo 8.50, V 1.20, Co 5.00, Si .25	2000	1800	1500	1400	2200	1025	Oil, Air Mach. 55 Movement A
Cold Work Dies	SUPER MO CHIP High Speed	C .59, Mn .25, Cr 4.20, W 1.65, Mo 8.15, V 1.80, Co 8.20, Si .25, B .50	2000	1800	1550	1400	2075	1025	Oil, Air Mach. 40 Movement A
Cold Work Dies	SUPER STAR-MO High Speed	C .84, Mn .25, Cr 4.10, W 5.50, Mo 4.50, V 1.80, Co 9.00, Si .25	2000	1700	1550	1450	2225	1025	Oil, Air Mach. 45 Movement A
Cold Work Dies	TRIPLE DIE Oil Hardening	C 2.20, Cr 12.00, V .15	1950	1700	1650	1400	1800	450	Oil Mach. 40 Movement A
Cold Work Dies, Tools	Diamond M Water Hardening	C 1.30, Mn .28, Cr .28, Si .20	1800	1450	1400	1200	1425	400	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	F.S. BEST Water Hardening	C As Spec., Mn .30, Cr .08, Si .20	1800	1450	1400	1200	1440	400	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	F.S. EXTRA Water Hardening	C As Spec., Mn .30, Cr .08, Si .20	1800	1450	1400	1200	1440	400	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	F.S. SPECIAL Water Hardening	C As Spec., Mn .28, Si .20	1800	1450	1400	1200	1440	400	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	GLOBE DRILL ROD Water Hardening	C 1.25, Mn .30, Cr .12, Si .20	1800	1450	1400	1200	1425	400	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	SILVAN STAR Water Hardening	C 1.05, Mn .30, Cr .10, V .20, Si .20	1800	1450	1400	1200	1440	400	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	SILVER STAR Water Hardening	C As Spec., Mn .30, Cr .08, Si .20	1800	1450	1400	1200	1440	400	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	SPECIAL A.S.V. Water Hardening	C As Spec., Mn .25, Si .20	1800	1450	1400	1200	1440	400	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	SPECIAL XX Water Hardening	C As Spec., Mn .30, Cr .08, Si .20	1800	1450	1400	1200	1440	400	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	STERLING Water Hardening	C As Spec., Mn .30, Cr .08, Si .20	1800	1450	1400	1200	1440	400	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	STERLING V Water Hardening	C As Spec., Mn .35, Cr .15, V .20, Si .20	1800	1450	1400	1200	1440	400	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	STERLING XX Water Hardening	C As Spec., Mn .30, Cr .08, Si .20	1800	1450	1400	1200	1440	400	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	STER M Water Hardening	C 1.25, Mn .30, Cr .25, Si .20	1800	1450	1400	1200	1425	400	Brine, Water Mach. 100 Movement C
Cutting Tools (Light Interrupted Cuts, Slow Speeds)	FIRTHITE H, Carbide	WC 94, Co 6							
Cutting Tools (Rough Intermittent Cuts, Coarse Feeds)	FIRTHITE HB, Carbide	WC 92, Co 8							
Cutting Tools (Strongest WC grade, Skiving)	FIRTHITE HC, Carbide	WC 87, Co 13							

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	SUGGESTED TEMPERATURE RANGES (°F)						Quenching Medium. ★ % Machinability Annealed. Movement in Hardening.
			Forging	Finish Forging	Annealing	Preheating	Hardening	Tempering	
Cutting Tools (Light Cuts, Fine Feeds, except steel)	FIRTHITE HE, Carbide	WC 96, Co 4							
Cutting Tools (Heavy Duty)	FIRTHITE T04, Carbide	WC 86, Co 10, Ti 4							
Cutting Tools (Light Steady Cuts, Fine Feeds)	FIRTHITE T16, Carbide	WC 76, Co 8, Ti 16							
Cutting Tools (Heavier Duty on Steel than T83)	FIRTHITE T66, Carbide	WC 60, Co 12, Ta 28							
Cutting Tools (Medium Feed, Stronger than AA)	FIRTHITE T83, Carbide	WC 82, Co 8, Ti 10							
Cutting Tools (Medium Feeds, more crater resisting than TA)	FIRTHITE T89, Carbide	WC 73, Co 10, Ti 12, Ta 5							
Cutting Tools (Finishing)	R.T. STEEL Water Hardening	C 1.30, Mn .35, Cr .25, W 3.50	1900	1600	1450	1250	1575	350 ...	Brine, Water Mach. 60 Movement C
Cutting Tools	(See BLUE CHIP, CIRCLE C, FS1-5, FS2-5, HI-MO, HI-MO-V, H.V. BLUE CHIP, MO CHIP, STAR BLUE CHIP, STAR-MO M2, SUPER HI-MO, SUPER MO CHIP, SUPER STAR-MO, Listed Above)								
Die Casting Dies	B.D.C. Oil, Air Hardening	C .33, Mn .35, Cr 12.00, W 12.00, V 1.05, Si .35	2050	1700	1575	1500	2300	1150	Air, Oil Mach. 50 Movement A
Die Casting Dies	H.W.D. Oil, Air Hardening	C .35, Mn .60, Cr 5.00, W 1.40, Mo 1.55, V .25, Si 1.00	1900	1550	1550	1400	1875	1150	Air, Oil Mach. 75 Movement A
Die Casting Dies	L.T. FORGING DIE Oil, Air Hardening	C .33, Cr 3.50, W 9.50, V .35	2000	1650	1620	1500	2150	1200	Air, Oil Mach. 60 Movement A
Drawing Dies	R.T. STEEL	(Listed Above)							
General Purpose	FIRTHITE HA, Carbide	WC 95, Co 5							
General Purpose	FIRTHITE TA, Carbide	WC 84, Co 6.5, Ti 9.5							
Hot Work Dies	C.Y.W. Oil, Air Hardening	C .95, Mn .50, Cr 3.60	1800	1500	1475	1300	1800–1600	800 ...	Air, Oil Mach. 80 Movement A
Hot Work Dies	HOT WORK BLUE CHIP Oil, Air Hardening	C .58, Cr 4.00, W 18.00, V 1.00	2100	1750	1620	1500	2250	1200	Oil, Air Mach. 60 Movement A
Hot Work Dies	XDH Oil, Air Hardening	C .50, Cr 4.00, W 18.00, V 1.00	2100	1650	1620	1500	2250	1150	Oil, Air Mach. 60 Movement A
Hot Work Dies	XDL Oil, Air Hardening	C .38, Cr 3.50, Cr 14.00, V .35	2000	1600	1575	1500	2100	1150	Oil, Air Mach. 65 Movement A
Hot Work Dies	XDM Oil, Air Hardening	C .45, Cr 4.00, W 17.50, V .35	2100	1650	1600	1500	2200	1150	Oil, Air Mach. 60 Movement A
Hot Work Dies	(See B.D.C., H.W.D., L.T. FORGING DIE, Listed Above)								
Punching and Shearing	CHIMO PUNCH Water, Oil Hardening	C .55, Mn .95, Cr .15, Mo .50, V .15, Si 2.00	1900	1600	1530	1250	1600–1650	450 ...	Water, Oil Mach. 85 Movement B
Punching and Shearing	DEMMLER D Water, Oil Hardening	C .50, Mn .75, Cr 1.00, V .20, Si .25	1800	1550	1450	1200	1500–1600	400 ...	Water, Oil Mach. 75 Movement C
Punching and Shearing	J.S. PUNCH Oil Hardening	C .50, Mn .30, Cr 1.40, W 2.50, V .20	1950	1550	1440	1350	1750	450 ...	Oil Mach. 80 Movement A
Shock Resisting	(See CHIMO PUNCH, DEMMLER D, J.S. PUNCH, Listed Above)								
Shock Resisting (Bolt Heading)	FIRTHITE ND20, Carbide	WC 75, Co 20, Ta 5							
Shock Resisting (Punches, Cold Heading)	FIRTHITE ND25, Carbide	WC 70, Co 25, Ta 5							
Wear Parts (Guides, Gage Blocks)	FIRTHITE T41H, Carbide	WC 82, Co 8, Ta 10							

HAYNES STELLITE CO., S. Lindsay St., Kokomo, Ind.

Listing No. 23

Cutting Tools (Roughing)	STELLITE Star J-Metal Alloy (Cast Alloy)	Cr .30-.35, W .13-.20, Co .40 Min.
Cutting Tools (Roughing)	STELLITE 98M 2 ALLOY (Cast Alloy)	Cr .27-.31, W .16-.19, Co .35 Min.
Hot Punching, Hot Shearing (Hard-Facing Material)	HASTELLOY ALLOY C* Nickel Base Alloy	Cr 14-16, W 3-5, Mo 16-18, Ni Bal.
Hot Punching, Hot Shearing (Hard-Facing Material)	STELLITE ALLOY NO. 6* Cast Alloy	Cr 25-27, Ni 20-25, Co Bal.
Shock Resisting (Hard-Facing Material)	STELLITE ALLOY NO. 12* Cast Alloy	Cr 27-31, W 7-10, Co Bal.

* These alloys are available in castings for the services specified. Hastelloy alloy C and Stellite alloy No. 6 are also recommended for shock resisting service.

JEWELRY FIRM MAKES LOCK FOR BRIEFCASE

Above: Rexlock for Rexbilt Case, and its parts. Made by the jewelry firm of Augat Bros., Inc., Attleboro, Mass. Many parts of Revere brass.

Rexbilt Briefcase, made by Rexbilt Leather Goods Corp., 151 West 26th St., New York 1, N. Y.

THIS is the story of a briefcase. It has some unusual angles that will be entirely unsuspected by the men who happily tote the case. They would never guess it, but the interesting and quite new combination lock was made by Augat Bros., Inc., Attleboro, Mass. The Augats are manufacturing jewelers, long-time customers of Revere. If those who buy the Rexbilt briefcase think the lock is a jewel, they will be quite right.

Perhaps the Rexbilt Leather Goods Corporation, New York City, really did not have to go to a jewelry maker to have the new Rexlock made with the necessary precision. But you know how people are when they want to offer a really fine product. Fussy. That protects quality. Anyhow, Augat Bros. and Rexbilt are very happy, and so is Revere, for Revere brass is largely used in the lock wherever beauty, reliability and corrosion resistance are important. Some die castings and sheet steels are also used. This, then, is another good example of the wise choice of the proper materials to meet operating conditions, assuring prolonged service and enduring satisfaction to the user. Incidentally, not only is solid brass used liberally in the lock itself, but the handle posts are of the same enduring metal. Thus you have a combination of good metals, good leathers, a good lock idea, to make a quality briefcase . . . . Revere is always glad to collaborate with manufacturers seeking good metals, and welcomes the opportunity to study both new and old applications.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, New York

• • •

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; New Bedford, Mass.; Rome, N. Y. — Sales Offices in Principal Cities, Distributors Everywhere.

Shock Resisting ..... STELLITE ALLOY NO. 12* ..... Cr 27-31, W 7-10, Co Bal.
(Hard-Facing Material) Cast Alloy

HEPPENSTALL CO., 4620 Hatfield St., Pittsburgh 1, Pa.

Listing No. 24

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	SUGGESTED TEMPERATURE RANGES (°F)						Quenching Medium. ★ % Machinability Annealed. Movement in Hardening.
			Forging	Finish Forging	Annealing	Preheating	Hardening	Tempering	
Cold Shearing	EIS14 Water Hardening	C .75, Mn .40, V .10, Si .60	1950	1700	1425	1200	1460	*	Water
Cold Shearing	EIS15 Water Hardening	C .90, Mn .40, V .10, Si .60	1950	1700	1425	1200	1440	*	Water
Cold Shearing	EIS43 Oil, Air Hardening	C 1.50, Mn .25, Cr 11.50, W .75, Mo .75, Si .35	2000	1800	1650	1300	1850	*	Air, Oil
Cold Shearing	EIS45 Oil, Air Hardening	C .80, Mn .25, Cr 11.50, Mo .45, Si .35, Ni .80	2050	1800	1650	1300	1780	*	Air, Oil
Cold Shearing	EIS97 Oil Hardening	C .55, Mn 1.00, Cr .30, Mo .40, Si 2.00	2100	1800	1475	1250	1600	*	Oil
Cold Work Dies	(See EIS43, EIS45, Listed Above)								
Cold Work Dies	2V72 Water Hardening	C .75, Mn .40, V .10, Si .60	1950	1700	1425	1200	1460	*	Water
Cold Work Dies	2V90 Water Hardening	C .90, Mn .40, V .10, Si .60	1950	1700	1425	1200	1440	*	Water
Die Casting Dies (Zinc, Aluminum)	EIS717 Oil, Air Hardening	C .40, Mn .35, Cr 5.25, Mo 1.25, V 1.00, Si 1.00	2200	1800	1600	1450	1850	*	Air, Oil
Hot & Cold Trimming	EIS41 Oil, Air Hardening	C .95, Mn .30, Cr 3.75, Mo .25, V .20, Si .25	2000	1800	1500	1250	1650	*	Air, Oil
Hot & Cold Trimming	EIS51 Oil Hardening	C .65, Mn .65, Cr .75, W 2.25, Si .30, Ni 1.50	2100	1800	1450	1250	1525	*	Oil
Hot Shearing	EIS73 Oil, Air Hardening	C .30, Mn .30, Cr 3.50, W 9.00, V .25, Si .45	2100	1800	1600	1500	2150	*	Air, Oil
Hot Shearing	EIS77 Oil, Air Hardening	C .35, Mn .30, Cr 4.00, W 12.00, V .25, Si .30	2100	1800	1600	1500	2200	*	Oil, Air
Hot Shearing	EIS718 Oil, Air Hardening	C .35, Mn .30, Cr 4.75, W 1.25, Mo 1.50, Si 1.00	2100	1800	1600	1450	1850	*	Air, Oil
Hot Work Dies	"C" ANNEAL Oil Hardening	C .55, Mn .80, Cr 1.00, Mo .45, V .08, Si .25	2250	1800	1450	1300	1550	*	Oil
Hot Work Dies	C55 Oil Hardening	C .55, Mn .50, Cr .90, Mo .30, Si .25, Ni 1.50	2250	1800	1450	1300	1550	*	
Hot Work Dies	EIS57 Oil, Air Hardening	C .55, Mn .60, Cr .90, Mo .75, Si .60, Ni 2.25	2250	1800	1450	1300	1600	*	Air, Oil
Hot Work Dies	(See EIS73, EIS77, EIS718, Listed Above)								
Hot Work Dies	HARDTEM Prehardened	C .55, Mn .80, Cr 1.00, Mo .45, V .08, Si .25							
Hot Work Dies	PYRONEAL Oil, Air Hardening	C .55, Mn .60, Cr .90, Mo .75, Si .60, Ni 2.25	2250	1800	1450	1300	1600	*	Air, Oil
Hot Work Dies	PYROTEM Prehardened	C .55, Mn .60, Cr .90, Mo .75, Si .60, Ni 2.25							
Hot Work Dies	SILVER HARDTEM Prehardened	C .55, Mn .80, Cr 1.00, Mo .45, V .08, Si .25, Ag .20							
Hot Work Dies	SILVERTEM Prehardened	C .35, Mn .30, Cr 4.75, W 1.25, Mo 1.50, Si 1.00, Ag .20							
Hot Work Dies	5H50 Oil Hardening	C .55, Mn .80, Cr 1.00, Mo .45, V .08, Si .25	2250	1800	1450	1300	1550	*	Oil
Plastic Molding Dies	HARDTEM (Listed Above)								
Plastic Molding Dies	EIS96 Oil Hardening	C .55, Mn .80, Cr 1.00, Mo .45, V .08, Si .25	2250	1800	1450	1300	1550	*	Oil

* Variable Range

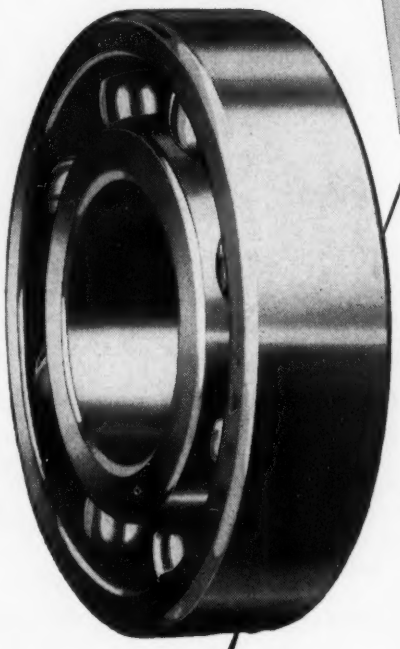
★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels, and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement—"+" denotes expansion, "—" denotes contraction.

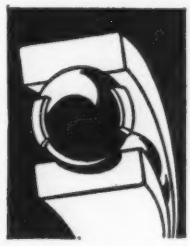
★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement—"+" denotes expansion, "—" denotes contraction.

GROUND

POLISHED

HONED





Only HOOVER does all three

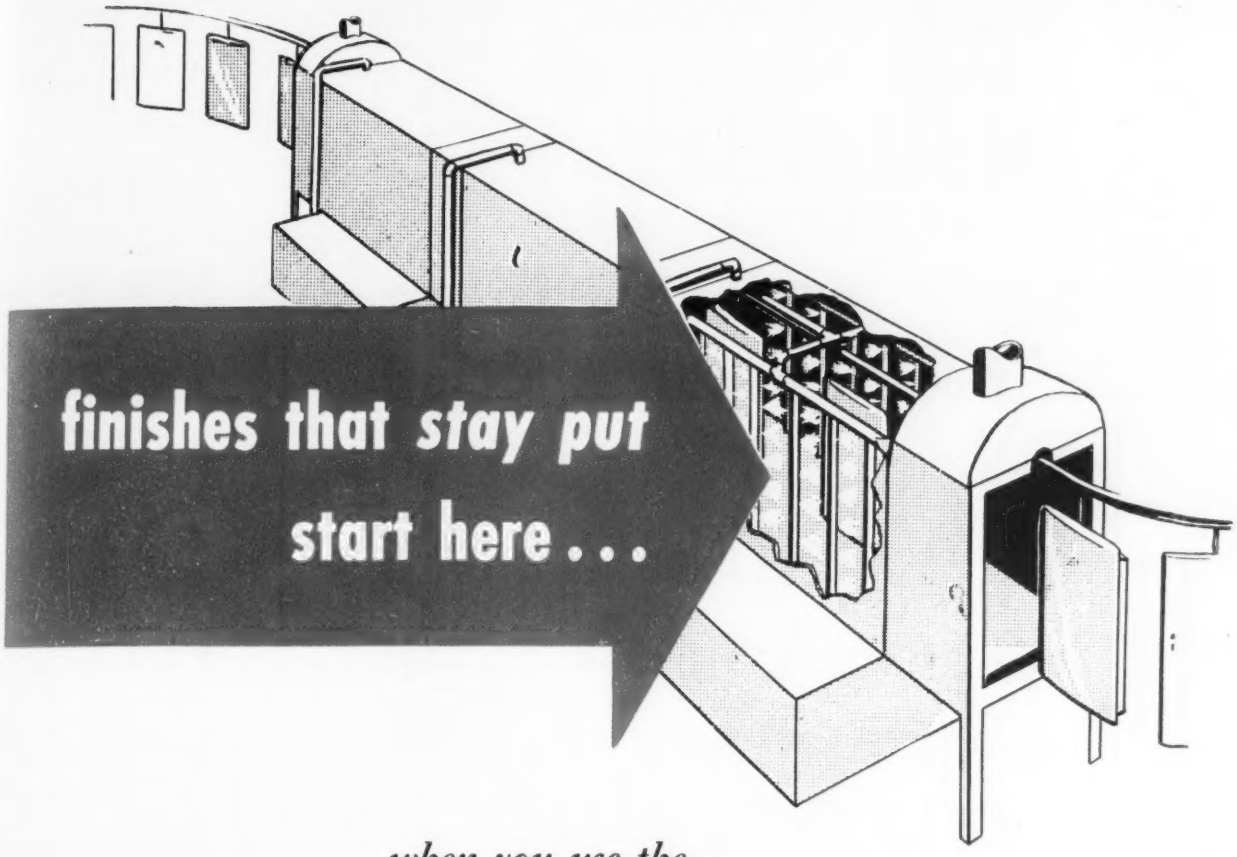
Modern machines are being constantly designed for faster operating speeds. These higher speeds demand bearings with raceways so smooth as to reduce friction to a minimum. Grinding and polishing of ball bearing raceways is no longer sufficient. To provide the mirror-smooth surface necessary at high speeds, Hoover has developed a method of honing the raceways by production line methods. That is why manufacturers everywhere are finding that Hoover Ball Bearings have 30% longer life . . . 30% greater load carrying capacity . . . and a smoothness and quietness heretofore unheard of.

THE ARISTOCRAT OF BEARINGS

Hoover America's only Ball Bearing with HONED RACEWAYS

HOOVER BALL AND BEARING CO., ANN ARBOR, MICH.

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	SUGGESTED TEMPERATURE RANGES (°F)						Quenching Medium. ★ % Machinability Annealed. Movement in Hardening.
			Forging	Finish Forging	Annealing	Preheating	Hardening	Tempering	
HOUGHTON & RICHARDS INC., 19 Jersey St., Boston 15, Mass.									**Listing No. 25**
Carbide Shank Steel	H & R No. 8 Water, Oil Hardening	C .55, Mn .85, Cr .25, V .25, Si 2.10	1600–2000	....	1475	....	1575–1625	400–500	Water, Oil Mach. 85 Movement +B
			....	....	....	....	1625–1675	...	
Carbide Shank Steel	H & R No. 8M Water, Oil Hardening	C .55, Mn .75, Mo .20, Si 2.00	1700–1900	1550–1650	1450–1500	....	1550–1625	300–500	Water, Oil Mach. 85 Movement +B
			....	....	....	....	1600–1675	...	
Carbide Shank Steel	H & R N150 Oil Hardening	C per temper, Mn .55, Cr .85, Mo .42, Si .30, Ni 1.40	1550–1900	....	1425–1450	....	1425–1500	350–1000	Oil Mach. 75 Movement +A
Cold Heading	H & R HEADING DIE Water Hardening	C .90-1.00, Mn .20, Si .30	1550–1850	....	1375–1425	....	1450–1550	300–700	Brine Mach. 100 Movement +C
Cold Work Dies (Blanking, Cold Forming)	H & R GOLD LABEL Water Hardening	C 1.33, Mn .35, W 4.25, Mo .35, Si .49	1750–1850	1450–1525	1400–1450	1100–1200	1525–1575	300–425	Brine, Water Mach. 70 Movement +C
Cold Work Dies (Blanking, Cold Forming)	H & R K Oil Hardening	C 2.32, Mn .32, Cr 13.00, V .22, Si .22	1900–2000	1700–1750	1600–1650	1200–1300	1750–1800	350–900	Oil Mach. 40 Movement +A
Cold Work Dies (Blanking, Cold Forming)	H & R K-2 Oil, Air Hardening	C 1.50, Mn .25, Cr 11.50, Mo .75, V .25, Si .30	1900–2000	1650–1700	1600–1650	1200–1300	1800–1850	300–900	Oil, Air Mach. 45 Movement +A
Cold Work Dies (Blanking, Cold Forming)	H & R OIL HARDENING Oil Hardening	C .95, Mn .95, Cr .55, Si .20	1700–1800	above 1450	1375–1400	1200	1425–1500	325–375‡‡	Oil Mach. 90 Movement +B
Cold Work Dies (Blanking, Cold Forming)	H & R TUNGSTEN OIL HARDENING Oil Hardening	C .90, Mn 1.10, Cr .50, W .50, V .20, Si .25	1700–1850	1500–1550	1440–* 1460	1100–1200	1450–1500	300–350§§	Oil Mach. 90 Movement +B
Cold Work Dies (Blanking, Cold Forming)	H & R No. 19 Oil Hardening	C .92, Mn 1.55, Cr .18, Si .32	1750–1800	....	1425–1450	....	1425–1450	350–400	Oil Mach. 90 Movement +A
Cold Work Dies (Blanking, Cold Forming)	H & R No. 60 Water, Oil Hardening	C 1.20, Mn .25, Cr .70, W 1.60, Mo .25, V .20, Si .30	1700–1850	1550–1600	1440–* 1460	1100–1200	1450–1525	300–600	Water, Oil Mach. 85 Movement +A
			....	....	....	....	1550–1650	...	
Cold Work Dies (Blanking, Cold Forming)	H & R No. 61 Air Hardening	C 1.35, Mn .25, Cr 12.12, M .64, Co 3.04, Si .50	1950–2000	....	1625–1650	1200–1250	1825–1850	400–650	Air Mach. 60 Movement +A
Cold Work Dies (Blanking, Cold Forming)	H & R No. 80 Air Hardening	C 1.00, Mn .65, Cr 5.25, Mo 1.10, V .25, Si .20	1900–2000	1700–1750	1550–§ 1600	....	1750–1800	250–950	Air Mach. 85 Movement +A
Cutting Tools (Roughing)	H & R SUPER COBALT High Speed	C .80, Mn .20, Cr 4.25, W 20.50, Mo .60, V 1.35, Co 12.25, Si .32	1800–2100	....	1650–1700	1600–1700	2325–2375	1000–1200	Air, Oil, Salt Bath Mach. Movement +A 40
Cutting Tools (Roughing)	H & R No. 4 High Speed	C .80, Cr 4.50, W 18.50, Mo .80, V 1.75, Co 7.50	2000–2150	1750–1800	1600–‡ 1650	1450–1600	2325–2375	1100–1150	Oil, Air, Salt Bath Mach. Movement +A 45
Cutting Tools (Roughing, Finishing)	H & R COBALT High Speed	C .78, Cr 4.00, W 18.00, V 1.00, Co 5.00	2050–2200	1750–1800	1600–‡ 1650	1450–1600	2350–2400	950–1100	Oil, Air, Salt Bath Mach. Movement +A 50
Cutting Tools (Roughing, Finishing)	H & R COBALT MOLY High Speed	C .88, Mn .25, Cr 4.10, W 6.00, Mo 6.00, V 1.90, Co 9.00, Si .25	1950–2050	....	1550	1400–1500	2220–2260	1025–1075	Oil Mach. 45 Movement +A
Cutting Tools (Roughing, Finishing)	H & R MOLYHI High Speed	C per temper, Cr 4.00, W 1.50, Mo 8.50, V 1.15	1900–2025	1600–1700	1450–‡ 1550	1350–1500	2150–2250	950–1100	Oil, Air, Salt Bath Mach. Movement +A 55
Cutting Tools (Roughing, Finishing)	H & R MOLY VAN High Speed	C .82, Cr 4.00, Mo 9.00, V 2.20	1850–2075	1600–1750	1450–‡ 1550	1250–1500	2150–2250	950–1100	Oil, Air, Salt Bath Mach. Movement +A 60
Cutting Tools (Roughing, Finishing)	H & R SUPER MOLYHI High Speed	C .82, Mn .25, Cr 4.00, W 1.50, Mo 8.50, V 1.25, Co 5.00, Si .32	1900–2075	1650–1750	1450–‡ 1550	1250–1550	2175–2275	950–1100	Oil, Air, Salt Bath Mach. Movement +B 50
Cutting Tools (Roughing, Finishing)	H & R No. 1 High Speed	C .70, Mn .20, Cr 4.00, W 18.00, V 1.00, Si .30	1950–2150	1700–1750	1600–‡ 1650	1450–1600	2325–2375	950–1100	Oil, Air, Salt Bath Mach. Movement +A 55
Cutting Tools (Roughing, Finishing)	H & R No. 2 High Speed	C .80, Cr 4.25, W 18.50, Mo .65, V 2.15, Si .35	1950–2150	1700–1750	1600–§ 1650	1500–1600	2325–2400	950–1100	Oil, Air, Salt Bath Mach. Movement +A 45
Cutting Tools (Roughing, Finishing)	H & R No. 3 High Speed	C 1.04, Mn .26, Cr 4.18, W 18.46, Mo .84, V 3.41, Si .27	1950–2050	....	1600–1650	1550–1600	2250–2300	1050–1070	Oil, Air, Salt Bath Mach. Movement +A 50
Cutting Tools (Roughing, Finishing)	H & R No. 7 High Speed	C 1.15, Mn .25, Cr 4.00, W 6.00, Mo 6.00, V 3.00, Si .25	1950–2050	....	1550	1400–1500	2200–2250	1025–1075	Oil Mach. 50 Movement +A
Cutting Tools (Roughing, Finishing)	H & R No. 57 High Speed	C .80, Mn .25, Cr 4.00, W 6.00, Mo 5.00, V 1.90, Si .25	1900–2050	1600–1700	1450–‡ 1550	1250–1550	2200–2300	950–1100	Oil, Air, Salt Bath Mach. Movement +A 55
Die Casting Dies	H & R HOT WORK No. 5 (Hot Work Type)	C .35, Mn .35, Cr 5.00, Mo 1.00, V .40, Si 1.00	1900–2000	1550–1650	1450–§ 1500	1200	1800–1825	900–1200	Air Mach. 65 Movement +A
Die Casting Dies	H & R HOT WORK No. 6 (Hot Work Type)	C .35, Mn .35, Cr 5.00, W 1.35, Mo 1.75, Si 1.00	1900–2000	1550–1650	1450–§ 1500	approx. 1200	1800–1825	900–1200	Air Mach. 75 Movement +A
Die Casting Dies	H & R No. 55 High Speed	C .35, Mn .25, Cr 5.25, W 5.25, Mo .20, V .20, Co .50, Si .90	1800–2000	1650–1700	1550–** 1600	....	1825–1950	950–1250	Air Mach. 65 Movement +A
Heading Dies	H & R SPECIAL HEADING DIE Water Hardening	C .90-1.00, Mn .20, Si .30	1550–1850	....	1375–1425	....	1450–1550	300–700	Brine Mach. 100 Movement +C



finishes that *stay put* start here . . .

when you use the

OAKITE CRYSCOAT PROCESS

to clean and condition ferrous metals

before painting, japaning, lacquering

That 3-stage automatic washing machine you're looking at is applying the Oakite CrysCoat Process—a specially formulated acid surface cleaner and conditioner that provides proper adhesion for durable, sales-appealing finishes. And does it at amazingly low cost per square foot of coverage.

REALLY ANCHORS YOUR FINISH!

The widely-used Oakite CrysCoat Process conditions metals *three* ways in *one* operation. It thoroughly, uniformly removes light oils, grease, spinning compounds and shop dirt. At the same time, the Oakite CrysCoat Process develops on steel and iron an inert, microscopically thin phosphate film that forms a highly receptive base for paint and other organic finishes; inhibits rust before finishing; localizes corrosion if finish is broken. The Oakite CrysCoat Process is designed for application in a three (or more) stage pressure-spray washing machine. Conclusive tests show that no continuous accumulation of scale and sludge build-up on equipment. A conveniently located Oakite Technical Service Representative will be glad to test-run the Oakite CrysCoat Process on your iron and steel products. Demonstrate its versatility as a conditioner for aluminum, zinc, iron, terne plate and copper alloy fabrications. Complete details contained in . . .

FREE SERVICE REPORT

Your letterhead request brings you complete technical data on the Oakite CrysCoat Process. Just ask for Oakite Service Report No. 6713R.

how the OAKITE CRYSCOAT PROCESS gives better finishes

Benefits You Get with the Oakite CrysCoat Process

- fast, thorough cleaning
- low cost per square foot of coverage
- greater resistance to chipping, flaking
- adsorptive paint-holding film
- solubility of material
- solution stability against change
- safety on equipment
- corrosion resistance
- no problem with scale or sludge removal

METAL FINISHERS!

Possibly you already know about the Oakite CrysCoat Process. But did you know Oakite also makes materials for precleaning by tank and machine; alkaline cleaning by tank and machine; pickling; barrel cleaning; electrocleaning; paint-stripping; steam-gun cleaning; burnishing and anti-rusting. For free facts about any of these cleaners, drop us a card.

OAKITE PRODUCTS, INC.
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Technical Service Representatives Located in Principal Cities of United States and Canada

OAKITE

Specialized Industrial Cleaning

MATERIALS • METHODS • SERVICE

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	SUGGESTED TEMPERATURE RANGES (°F)						Quenching Medium. ★ % Machinability Annealed. Movement in Hardening.
			Forging	Finish Forging	Annealing	Preheating	Hardening	Tempering	
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	H & R HOT WORK (Hot Work Type)	C .32, Cr 3.25, W 10.25, V .40, Si .28	1950–2000	....	1550–1600	1500–1600	2050–2150	900–1300	Oil, Dry Air Blast Mach. Movement +A 60
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	H & R HOT WORK No. 2 (Hot Work Type)	C .33, Mn .20, Cr 3.50, W 9.25, V .50, Si .30	1850–1950	1600–1650	1500–** 1550	1500–1550	1850–2200	950–1300	Oil, Water Mach. 60 Movement +A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	H & R HOT WORK No. 4 (Hot Work Type)	C .97, Mn .35, Cr 3.90, Si .35	1700–1900	....	1500–1550	approx. 1450	1750–1825	400–1000	Air Blast Mach. 80 Movement +A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	H & R HOT WORK No. 15 (Hot Work Type)	C .25, Mn .29, Cr 4.03, W 15.10, V .51, Si .26	1950–2100	....	1600–1650	1550–1600	2200–2250	1050–1200	Oil Mach. 65 Movement +A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	MYA Oil Hardening	C .42, Mn .30, Cr 1.45, V .25, Si 1.45	1600–1950	above 1500	1500	.... pack	1650–1750	350–600	Oil Mach. 55 Movement +B
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	H & R No. 225 Oil, Air Hardening	C .50, Mn .25, Cr 1.50, W 2.50, V .25 Mo .50 Max.	1800–2000	1500–1600	1425–1475	1150–1250	1650–1800 1700–1850	††	Oil, Air Mach. 80 Movement +A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	(See H & R HOT WORK No. 5, H & R HOT WORK No. 6, H & R No. 55, Listed Above)								
Pistons	H & R PISTON Water Hardening	C 1.14, Mn .32, Cr .58, V .19, Si .21	1850	....	1375–1425	....	1425–1475	300–500	Water Mach. 80 Movement +C
Plastic Molding Dies (All Types)	MYA Oil Hardening	(Listed Above)							
Punching and Shearing	H & R CARBON Water Hardening	C .90-1.05 or as specified, Mn .25, Si .20	1700–1900	1450	1375–† 1400	....	1425–1550	200–600	Water, Brine Mach. 100 Movement +C
Punching and Shearing	H & R SPECIAL CARBON Water Hardening	C .90-1.05 or as specified, Mn .25, Si .20	1700–1900	1450	1375–† 1400	....	1425–1550	200–600	Water, Brine Mach. 100 Movement +C
Punching and Shearing	H & R VANADIUM Water Hardening	C 1.05-1.15, Mn .25, V .18, Si .20	1700–1800	1550	1375–1450	....	1400–1550	200–600	Water, Brine Mach. 100 Movement +C
Punching and Shearing	(See H & R OIL HARDENING, H & R TUNGSTEN OIL HARDENING, H & R No. 19, H & R No. 60, H & R No. 225, Listed Above)								
Shock Resisting (Repeated Impact)	H & R SILCO Water, Oil Hardening	C .55, Mn .70, Mo .45, V .20, Si 2.15	1850–1950	1650–1750	1450–1475	....	1550–1600 1625–1650	400–650 ...	Water, Oil Mach. 65 Movement +B
Shock Resisting (Repeated Impact)	H & R SILICO Water, Oil Hardening	C .50, Mn .45, Mo .50, V .20, Si 1.10	1700–1900	1550–1650	1450–1500	....	1550–1625 1600–1675	300–500 ...	Water, Oil Mach. 65 Movement +B
Shock Resisting (Repeated, Intermittent Impact)	(See MYA, H & R No. 60, Listed Above)								

* Strain Relieving 1100-1200° F.
‡ Strain Relieving 1150-1350° F.
** Strain Relieving 1100-1250° F.
‡‡ Heavy Sections 400-450° F.
† Strain Relieving 1325-1375° F.
§ Strain Relieving 1200-1350° F.
†† Cold Work 300-500° F. Hot Work 750-1250° F.
§§ Heavy Sections 325-450° F.

HOYLAND STEEL CO. INC., 405 Lexington Ave., New York 17, N. Y. — Listing No. 26

Cold Work Dies	HSC COLD HEADER DIE STEEL Water Hardening	(Secure special information from manufacturer)							
Cold Work Dies	HSC-CVM Air Hardening	C .95-1.05, Mn .60-.80, Cr 5.00-5.50, Mo .95-1.25, V .20-.30, Si .20-.40	1950–1650	1650	1550–1600	1450	1700–1775	350–1000	Air
Cold Work Dies	HSC-CW-OIL Oil Hardening	C .85-.95, Mn 1.00-1.20, Cr .40-.60, W .40-.60, Si .25-.45	1800–1700	1475	1425–1450	1150–1200	1425–1475	300–400	Oil
Cold Work Dies	HSC SPECIAL Water Hardening	C 1.00-1.20, Mn .25-.35, Si .20-.30	1875–1850	1450	1375–1425	....	1400–1450	300–600	Water
Cold Work Dies	HSC-SS-EXTRA Water Hardening	C 1.00-1.10, Mn .25-.35, Si .25-.35	1875–1850	1450	1375–1425	....	1400–1450	300–600	Water
Cold Work Dies	HSC-350 Water Hardening	C 1.25-1.35, Mn .20-.40, W 3.00-4.00, Si .45	1900–1850	1550	1440–1475	1300–1400	1525–1575	350–400	Water
Cold Work Dies (Blanking)	HSC-265 Oil, Air Hardening	C 1.55-1.70, Mn .25-.35, Cr 11.50-12.50, Mo .70-.90, V .15-.25, Si .25-.35	2000–1650	1650	1600–1650	1400–1450	1775–1875	300–1000	Air, Oil
Cold Work Tools	HSC REGULAR Water Hardening	C as specified, Mn .20-.35, Si .25-.35	1875–1850	1450	1375–1425	....	1400–1450	300–600	Water
Cold Work Tools	HSC-VANCRO Water,Oil Hardening	C .45, Mn .70, Cr 1.00, Si .25, Va .15	2000–1900	1650	1450	....	1525–1650	350–900	Water, Oil

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	SUGGESTED TEMPERATURE RANGES (°F)						Quenching Medium * % Machinability Annealed. Movement in Hardening.
			Forging	Finish Forging	Annealing	Preheating	Hardening	Tempering	
Cold Work Tools	HSC REGULAR Water Hardening	C as specified, Mn .20-.35, Si .25-.35	1875– 1850	1450	1375– 1425	....	1400– 1450	300– 600	Water
Cold Work Tools	HSC-VANCRO Water,Oil Hardening	C .45, Mn .70, Cr 1.00, Si .25, Va .15	2000– 1900	1650	1450	....	1525– 1650	350– 900	Water, Oil

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	SUGGESTED TEMPERATURE RANGES (°F)						Quenching Medium * % Machinability Annealed. Movement in Hardening.
			Forging	Finish Forging	Annealing	Preheating	Hardening	Tempering	
Cutting Tools (Roughing)	HSC 18-4-1 Oil, Air Hardening	C .70-.75, Mn .10-.30, Cr 3.75-4.25, W 17.50-18.50, V .95-1.15, Si .25-.40	2050– 1700	1700	1600– 1650	1500– 1650	2200– 2400	900– 1200	Oil, Air
Die Casting Dies	HSC-33 Air Hardening	C .30-.35, Mn .30-.40, Cr 4.50-5.00, W 1.00-1.20, Mo 1.40-1.60, Si .80-1.00	2100– 2000	1650	1550– 1600	1400	1800– 1850	1000– 1100	Air
Hot Work Dies	HSC-310 Oil, Air Hardening	C .28-.33, Mn .20-.30, Cr 3.00-3.50, W 9.50-10.50, V .25-.50, Si .20-.40	2000– 1600	1600	1575– 1600	1500– 1550	1850– 2200	1000– 1300	Oil,Air
Hot Work Dies	HSC-313 Oil, Air Hardening	C .35-.40, Mn .20-.35, Cr 2.75-3.25, W 13.00-14.00, Si .20-.40	2000– 1600	1600	1575– 1600	1500– 1550	2000– 2200	1000– 1200	Oil, Air
Hot Work Dies	HSC-515 Air Hardening	C .35-.40, Mn .20-.35, Cr 4.80-5.30, W 4.80-5.30, Mo .15-.30, Si .80-1.10	1950– 1650	1650	1575– 1625	1250	1825– 1850	1000– 1200	Air
Hot Work Dies	HSC-33 (Listed Above)								
Hot Work Dies (Medium)	HSC-VANCRO (Listed Above)								
Plastic Molding Dies	REMA Water Hardening	C .05-.07, Mn .15-.20	1800– 2000	1400	1550	(Case harden at 1650°, reheat to 1425-1475°, quench in water, draw at 425°)			
Plastic Molding Dies	REMALLOY Water, Oil Hardening	C .10, Mn .50, Cr .65, Ni 1.50, Si .40	1800– 2000	1400	1550	(Case harden at 1650°, reheat to 1475-1525°, quench in oil or water, draw at 425°)			
Shock Resisting (Repeated Impact)	HSC 280 Water Hardening	C .50-.55, Mn .60-.80, Mo .30-.40, Si 1.30-1.60	1950– 2000	1600	1450– 1475	....	1575– 1650	275– 500	Water
Shock Resisting (Repeated Impact)	HSC 422 Water, Oil Hardening	C .45-.50, Mn .20-.50, Cr .85-1.05, W .90-1.20, Mo .15-.25, Si .15-.30	2000– 1900	1650	1450– 1475	1250	1650– 1850	300– 500	Water, Oil

HELLER BROTHERS CO., 865 Mt. Prospect Ave., Newark 4, N. J. — Listing No. 27

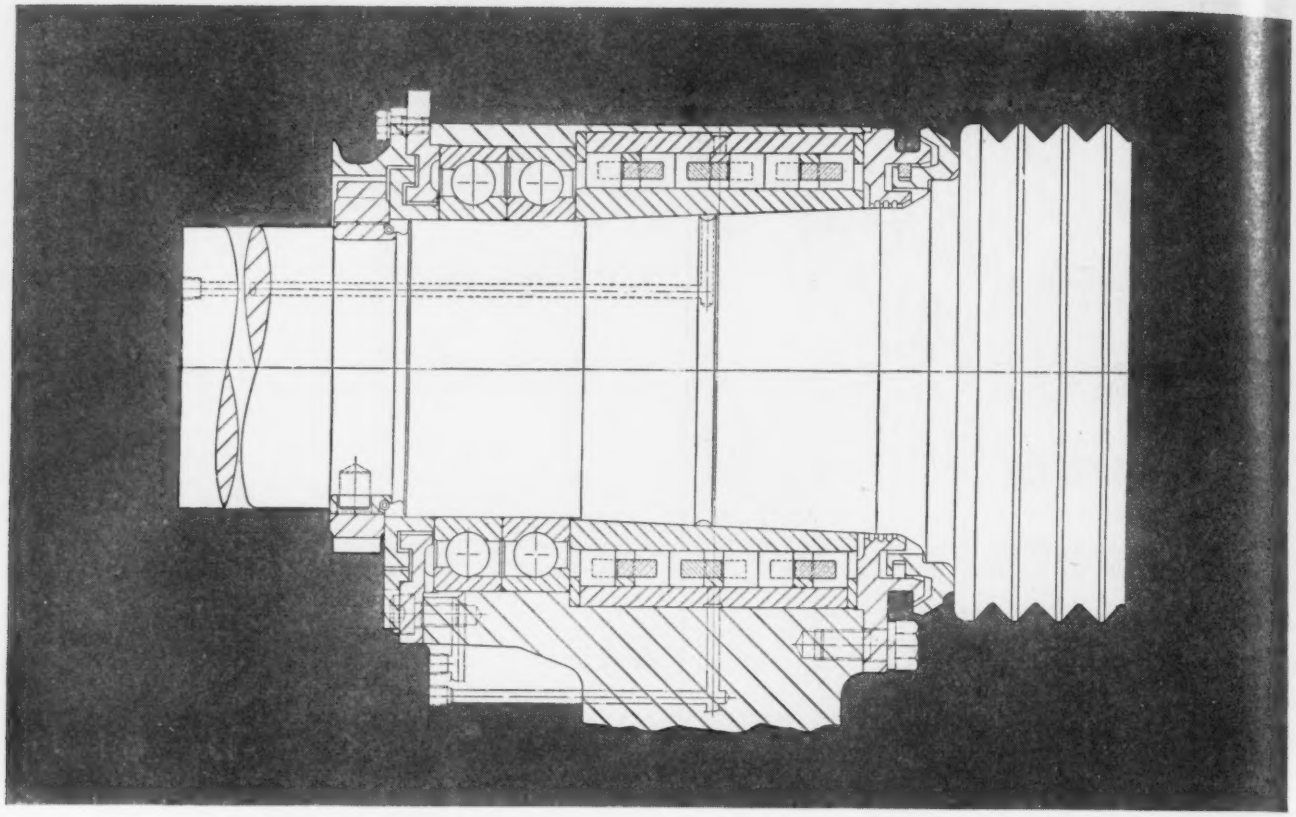
Cold Work	PURPLE LABEL Water Hardening	C .50-1.10, Mn .60 Max., Si .10-.30	1950– 1850	1475	1525– 1400	....	1500– 1425	300– 650	Water Movement B
Cold Work	WHITE LABEL Water Hardening	C .80-1.10, Mn .40 Max., Si .10-.30	1875– 1850	1475	1500– 1400	....	1475– 1425	300– 650	Water Movement B
Cold Work Dies	GRAY LABEL Oil Hardening	C .80-.90, Mn 1.15-1.35, Cr .40-.60, W .40-.60, Si .10-.30	1850– 1950	1500	1425– 1375	1200	1500– 1450	300– 450	Oil Movement B
Cold Work Dies	YELLOW LABEL Water Hardening	C .90-1.05, Mn .40 Max., V .15-.25, Si .15-.30	1875– 1850	1475	1425– 1375	....	1450– 1400	300– 500	Water Movement B
Cold Work Tools	GREEN LABEL Water Hardening	C .80-1.10, Mn .40 Max., Si .10-.30	1875– 1850	1475	1500– 1400	....	1475– 1425	300– 650	Water Movement B
Hot Work Dies	BROWN LABEL Oil, Air Hardening	C .85-1.00, Mn .30-.40, Cr 3.00-4.00, Si .15-.30	2000– 1800	1700	1525– 1475	1350	1750† 1650‡	900– 1050	Oil, Air Movement A
Punching, Shearing	BLUE LABEL Water Hardening	C .80-1.10, Mn .40 Max., Si .10-.30	1875– 1850	1475	1500– 1400	....	1475– 1425	300– 650	Water Movement B
Shock Resisting	NONTEMPERING Water Hardening	C .30-.37, Mn .30-.50, Cr .75-.90, Mo .40-.60, Cu .40-.60, Si .30-.60	2000– 1800	1600	1475– 1425	....	1900– 1700	Not Required	Water Movement B

† Air ‡ Oil

HIDALGO STEEL CO. INC., 74 Varick St., New York, N. Y. — Listing No. 28

Cutting Tools	MILO Water, Oil Hardening		1750	....	....	....	1550– 1650	450– 460	Water, Oil
Cutting Tools	UNICO Water, Oil Hardening		1900– 1600	....	1365– 1385	....	1500	... ...	Water Hardening§ Oil Hardening**
Punching and Shearing	FUEGO Water Hardening		1700– 1800	....	1450	....	1600– 1650	450– 600	Water
Shock Resisting	COLOSSO Water Hardening		2000– 1500	....	....	....	1700– 2000	Do not temper	Water
Shock Resisting	MILO (Listed Above)								

§ Draw to straw color ** No drawing needed.



For rod mills *at high speeds!*

The future belongs to those who prepare for it. That's particularly true of rod mill operation. It takes modern mills equipped with bearings designed for high speeds and precision rolling to meet the ever-increasing demand for greater production and higher quality. The new SKF rod mill roll-neck mounting incorporates the two bearing types best suited for the function each performs.

Light in section but high in radial capacity, the tapered bore SKF Cylindrical Roller Bearing permits large neck diameter and good fillet design for maximum neck strength and roll rigidity. Mounted with the desired tight fit, it's easily removed from the neck by the oil injection method also developed by SKF.

Preloaded SKF Ball Bearings over a period of many years have firmly established their ability to maintain the axial settings so essential in rolling high-grade rods to exacting tolerances.

Both bearings can be grease-lubricated, the grease supplementing the seals.

Prepare for *your* future now—either by *changing over* to SKF or by making sure SKF Bearings are included in your *new* equipment. 6478

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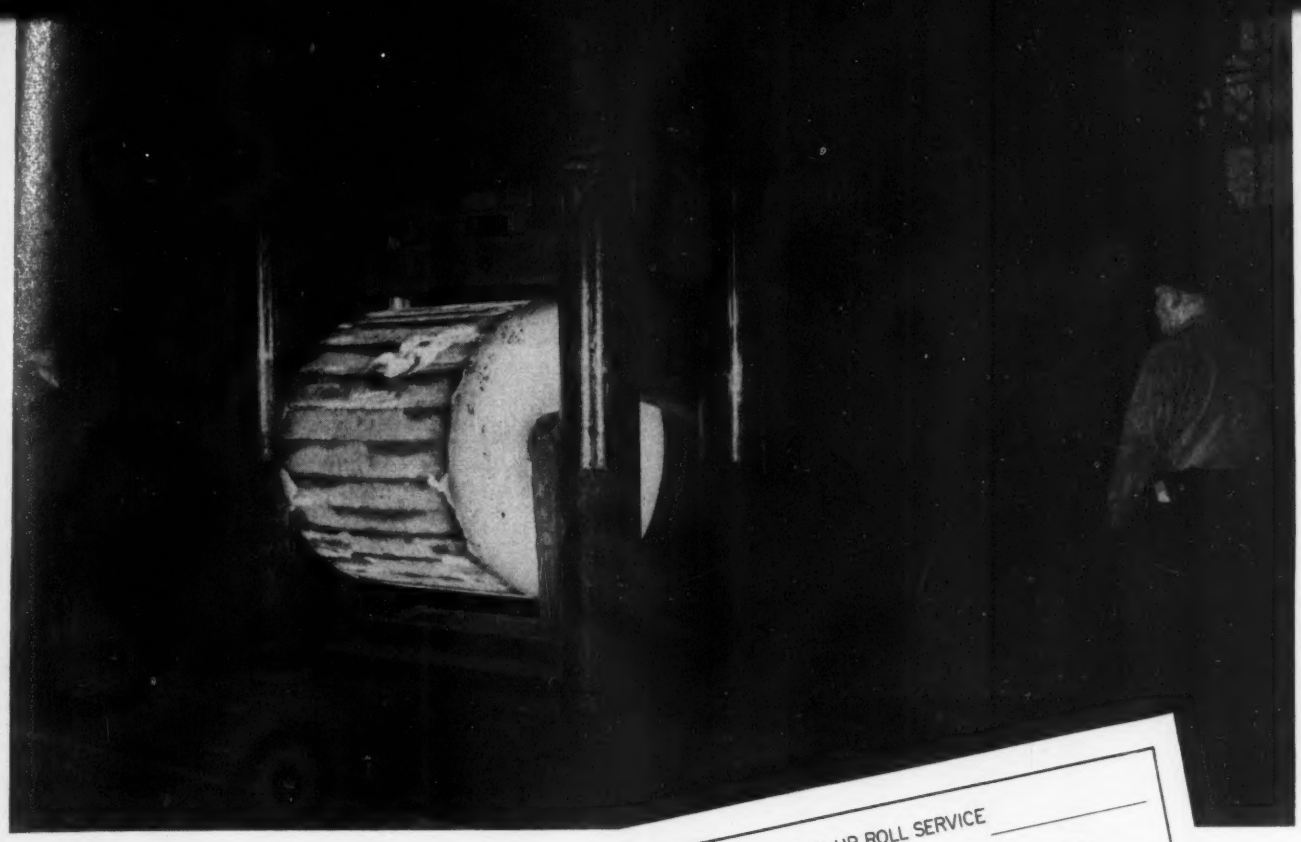
SKF
BALL AND ROLLER
BEARINGS



Output of *Tin Plate Gages* INCREASED 74%

. . . by use of forged sleeves on back-up rolls

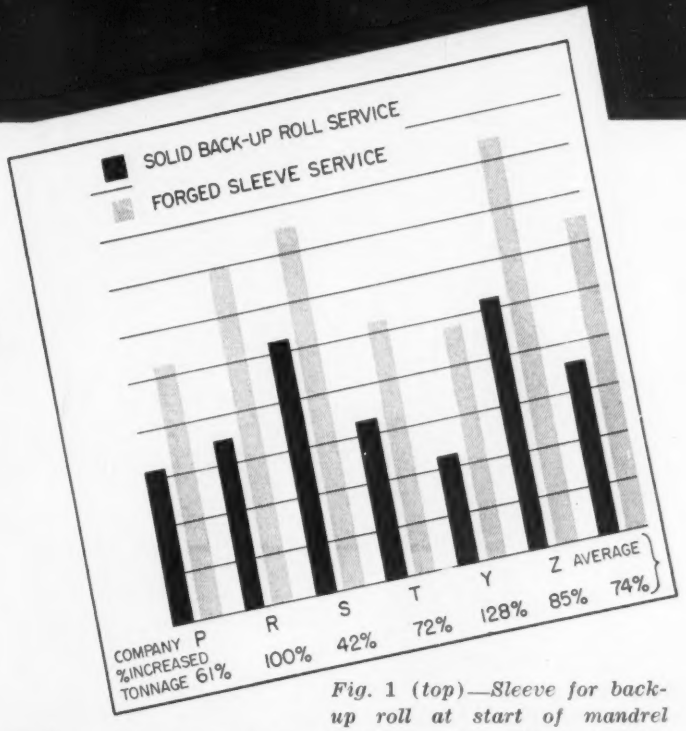


Fig. 1 (top)—Sleeve for back-up roll at start of mandrel forging. View shows forging after ingot is cogged, cut, upset forged and punched

Fig. 2 (bottom) — Increased tonnage received from back-up rolls using forged steel sleeves as against solid cast steel back-up rolls. Performance of forged sleeves as demonstrated from the above average of 74% increased tonnage was developed from experience of six steel rolling mills producing tin plate on tandem cold mills

AN AVERAGE tonnage increase of 74 per cent was obtained by six of the leading rolling mill companies with the use of forged sleeves on their back-up rolls, according to Heppenstall Co., Pittsburgh, which recently received an order for sleeve No. 1000—considered a milestone in the organization's forging history.

Forged back-up roll sleeves produced by the company for approximately the last two decades have compiled an impressive tonnage record in ferrous and nonferrous rolling mills throughout the industry. This situation is particularly significant in tandem cold rolling mills producing tin plate. Rolling mill men in the years prior to World War II were slowly experimenting with the composite roll. Peacetime production and postwar installations vastly expanded the acceptance of this type product.

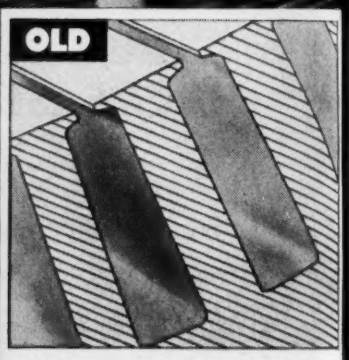
In early years of composite roll manufacture, the caution of rolling mill men had to be countered by week after week experimentation in combining sound forging practice with general metallurgical engineering knowledge, plus consideration of various rolling mill practices.

Intervening years taught both the organizations and strip mill men much about what can be expected from sleeved back-up rolls. Many vital manufacturing processes have passed through the experimental stage to standard and approved manufacturing procedures.

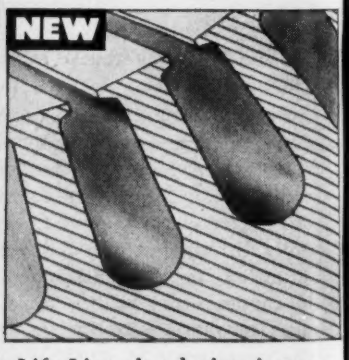
Possibly chief of these procedures is the use of the Sperry supersonic reflectoscope. Having several years previous experience with this testing instrument, the company now em-

(*Please turn to Page* 128)

Life-Line



Usual slot design is rectangular, with sharp corners into which slot cell insulation must be creased and coils must be pushed.



Life-Line slot design is pear-shaped. Coil slips in easily and fills slot—no corner voids remain to collect dirt and moisture.

NEW METHODS . . . NEW MATERIALS . . . OPEN WAY TO LONGER ELECTRIC MOTOR LIFE

An electric motor's "muscle" consists of the "sinews", or coils of wire, packed into slots in the stator of the motor.

If these are "bruised", or cramped or damaged while being put in—or if spaces are left for dirt or moisture to gather—protective insulation breaks down and electrical failures result. *Most motor failures are caused in this way.*

Life-Line—industry's all-steel motor—overcomes these common causes of motor failure. New, pear-shaped slots enable coils to be slipped into place without stress, eliminating need for tapping. No slot corners are left to require creasing of the slot insulation, nor to gather dirt in these voids.

New electrical design is just one of the benefits Life-Line motors bring to builders and users of motor-driven equipment. Get the details on Life-Line's smaller size, lighter weight, greater strength and smoothness.

Life-Line motors, now built in sizes from 1-15 hp, are available from stock in standard and near-standard types. "Specials" in Life-Line design are available on short shipment. Other sizes and types—up to 200 hp—soon will be changed over to modern Life-Line design. Check your nearest Westinghouse office for deliveries—or write or wire today to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.

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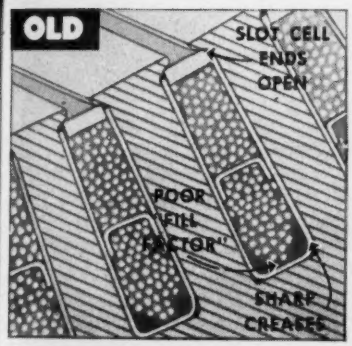
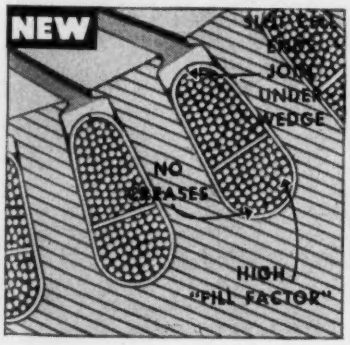
Westinghouse
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Life-Line motors

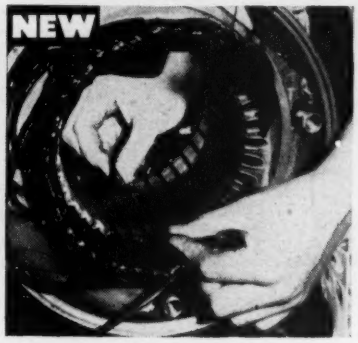


Rectangular slot design leaves many unfilled pockets for dirt, dust and moisture to accumulate and cause deterioration.

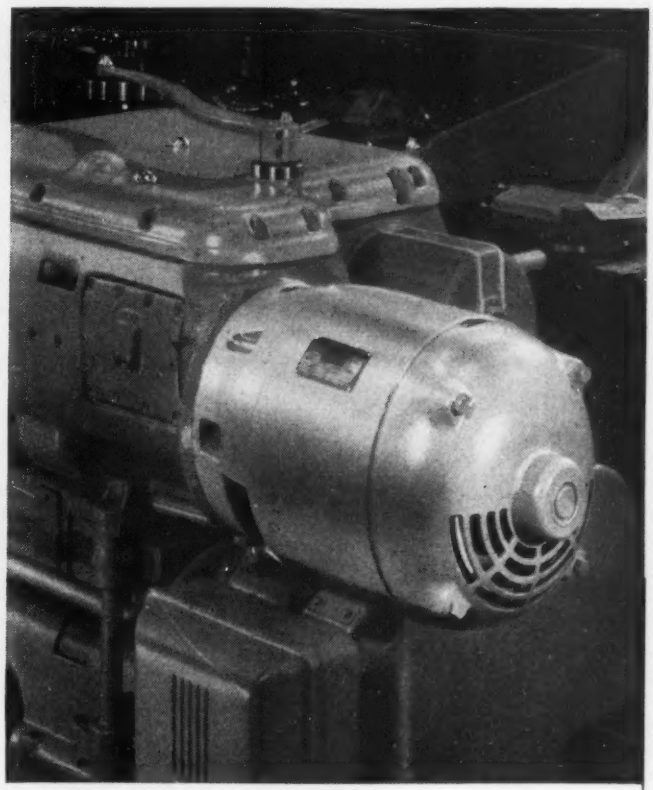
Old slot shape frequently required tapping last wires of the coil into position with resulting possible damage or weakening of insulation.



Pockets are eliminated—cell insulation is lapped over and covered by wedge. No sharp creasing of insulation is necessary.



Life-Line "pear-shaped" slots permit coils to be inserted snugly into position without need for tapping or weakening of the insulation.



LONGER LIFE ON THE JOB with freedom from electrical failures is assured by Life-Line motor manufacturing methods and new insulating materials.

APPLIED

X-Ray Metallography

By NORMAN P. GOSS
Consulting Physicist
Cold Metal Products Co.
Youngstown, O.

Development of crystallography covers a period of nearly two centuries. Density of any given specimen can be measured accurately but its value may be in error because of internal flaws. Arrangement of atoms in a crystal on the space lattice, as well as two types of lattice systems, are explained

ONE of the earliest discoveries relating to the physical properties of crystals was made by Bartholimus who, in 1670, observed that calcite ($CaCO_3$) was doubly refracting. At about the same time, Steno observed that the interfacial angles of crystals of the same substance were constant. Hauy (1743-1822) published various theories about the atomic structure of crystals. As a result of his investigations he believed that crystals were made up of atoms, but did not suspect that they were arranged upon a space lattice.

Again, in 1819, Mitcherlish observed that the form of crystals depended largely upon their chemical composition. Crystals of analogous composition were found to crystallize with similar crystal form and facial angles. Such crystals are said to be isomorphous, and it was later found that their physical properties are also related. This branch of crystallography is a part of the study of mineralogy and was developed largely to obtain a better understanding of the properties of crystals found in nature.

With the invention of the microscope, the mineralogist could examine the crystals at higher magnifications. According to the records, Sorby is believed to have been the first to examine polished and etched metallic specimens under the microscope.

Space Lattice Concept: This is a convenient means for visualizing the arrangement of atoms in a crystal on the space lattice. Associated with the atomic arrangement are important crystallographic directions, such as the direction in which magnetization is easiest, the direction in which the electrical conductivity and thermal diffusion are maximum, and the direction in which slip occurs when a metal is plastically deformed. Twinning occurs only on certain planes in preference to all the others. These are but a few of the many important physical properties which de-

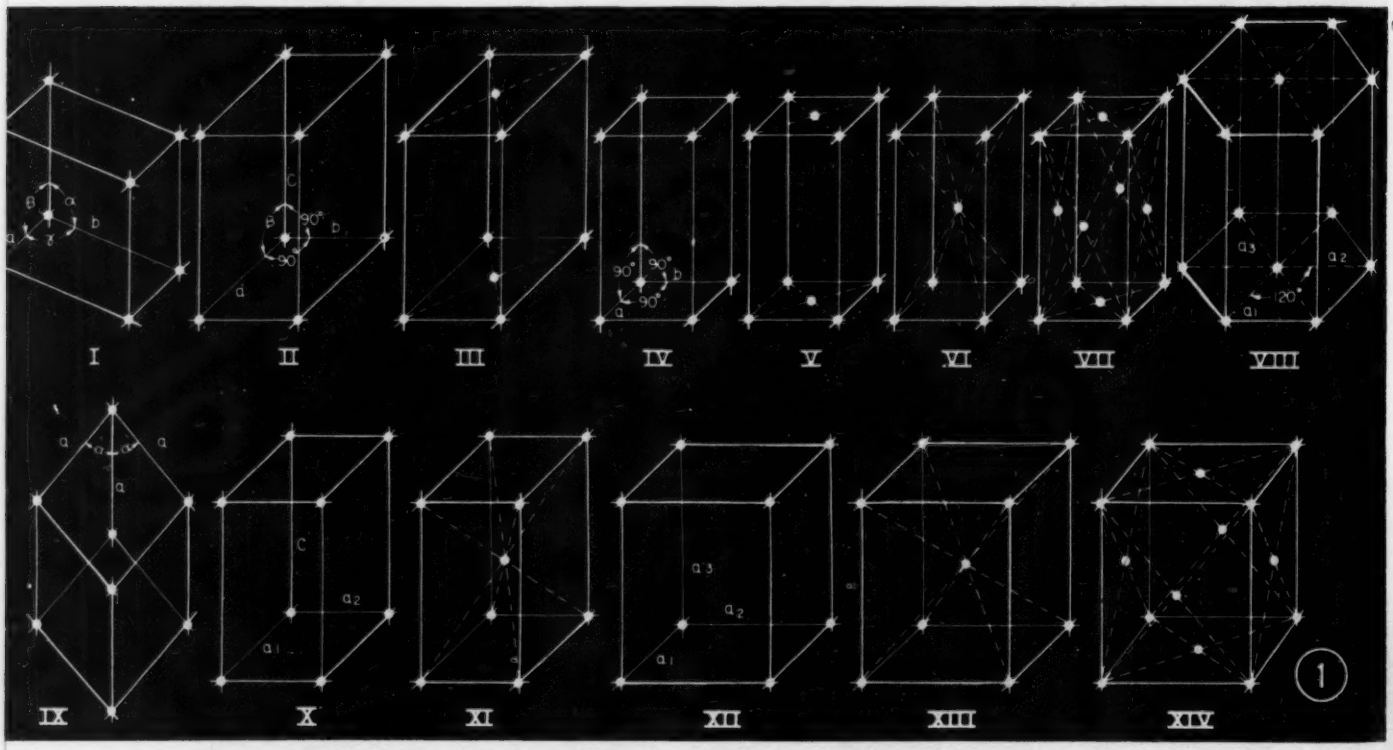
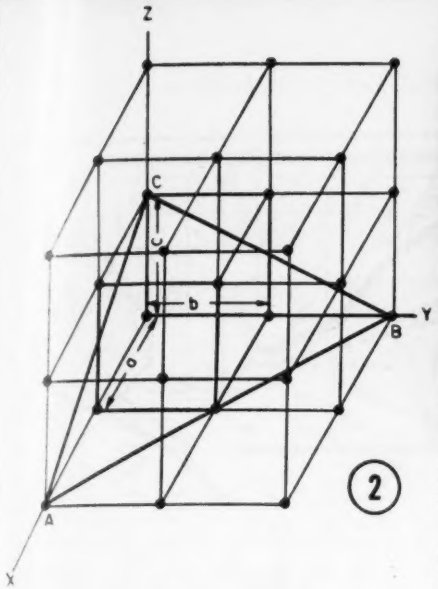


Fig. 1—Types of face lattices

1. *Triclinic*
2. *Simple monoclinic*
3. *End face centered monoclinic*
4. *Simple rhombic*
5. *End face centered rhombic*
6. *Body centered rhombic*
7. *Face centered rhombic*
8. *Hexagonal*
9. *Rhombohedral*
10. *Simple tetragonal*
11. *Body centered tetragonal*
12. *Simple cubic*
13. *Body centered cubic*
14. *Face centered cubic*



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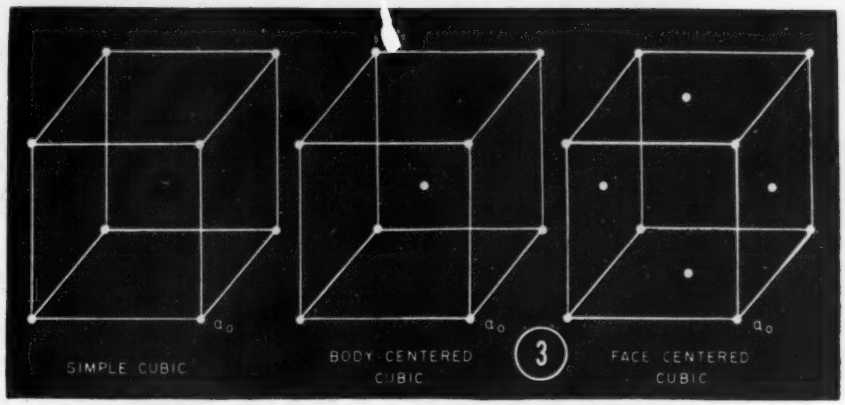


3

pend upon atomic arrangement and crystallographic direction.

Space lattices are confined to six types and all crystals found in nature can be referred to them. See Fig. 1. The six systems are:

1. Triclinic
2. Monoclinic
3. Orthorhombic
4. Tetragonal
5. Hexagonal
6. Cubic

Metals crystallize in only three of these, namely, cubic, hexagonal, and tetragonal. Since we are only interested in the structure of metals and alloys it is not necessary to consider the other lattice systems, except for complex structures such as the carbides. Most of the metals of commercial importance crystallize in the cubic system and a few in the hexagonal system. The lattice structure of these systems are easy to describe and understand.

The Miller Indices: The importance of Hauy's work was the designation of crystal faces according to some kind of systematic method. Several methods were devised and today the one most used and known is the Miller system of rational indices. Its general use is due to its simplicity. Since most of the more important metals crystallize in the cubic system (with the exception of zinc and magnesium—hexagonal), the Miller system will be followed entirely.

In Fig. 2 let a, b, c, be the measure numbers along the x, y and z axes, and A, B, C, the plane which is to be described in terms of the Miller system of rational indices. From Fig. 2 it will be seen that this plane cuts the x, y and z axes at:

$$OA = pa$$
$$OB = qb$$
$$OC = rc$$

where p, q and r are integers. The reciprocal of:

$$\frac{1}{p}, \frac{1}{q}, \frac{1}{r},$$

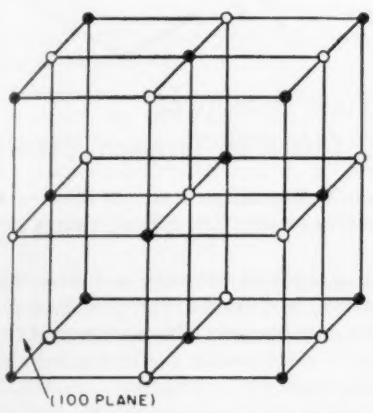
are in the ratio of qr, rp, and pq. Dividing each of these products by the greatest common divisor, n, gives the following:

$$h = \frac{qr}{n}, \quad k = \frac{rp}{n}, \quad 1 = \frac{pq}{n}$$

The h, k and l are known as the Miller system of rational indices.

The Miller indices for the plane

(*Please turn to page* 132)



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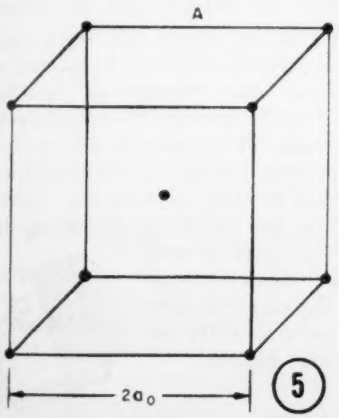

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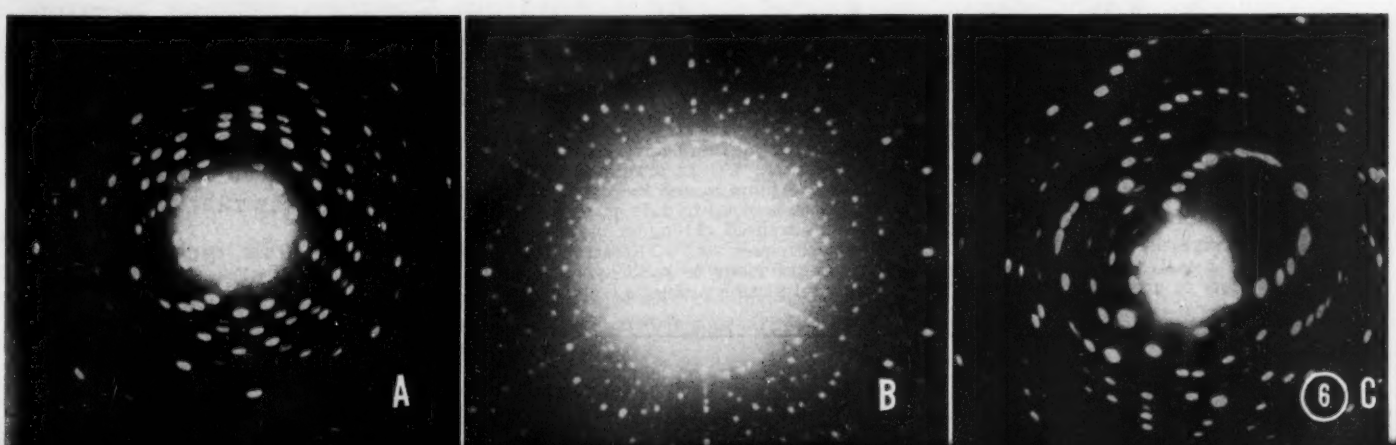
Fig. 2—Miller system of rational indices

Fig. 3—Three fundamental cubic lattices

Fig. 4—Lattice structure of salt (NaCl)

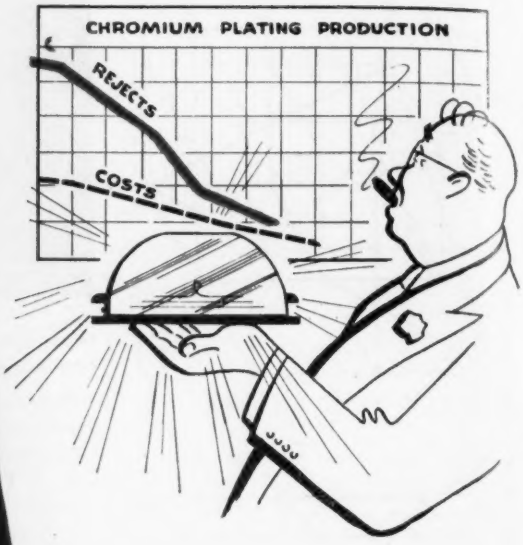
Fig. 5—Lattice structure of iron

Fig. 6—Laue diagrams. (A) Single crystal iron (Fe_3O_4); (B) Single crystal mica showing perfect crystal symmetry (hexagonal); (C) Single crystal copper sulphate ($CuSO_4$)



6

How to get BETTER CHROMIUM PLATING ...and also cut costs!



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Secondly, there's *appearance* of the plate. High grade work is free from cloudiness, burned edges, thin spots, blemishes. In short, you have high quality chromium when work comes from the bath sparkling bright, with no need for polishing—and when it provides long service life without rust or corrosion.

You can easily achieve the right quality chromium plate for *your* products—and save time, money and "headaches" besides—through United Chromium Technical Service. As the pioneer of the commercial chromium plating process, United Chromium offers you its unrivaled 20 years' experience in research, engineering, and in solving the plating problems of hundreds of companies. For more information on the many benefits of this service, write for this detailed bulletin.

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Studies Factors Affecting

Stabilization of Stainless Steels

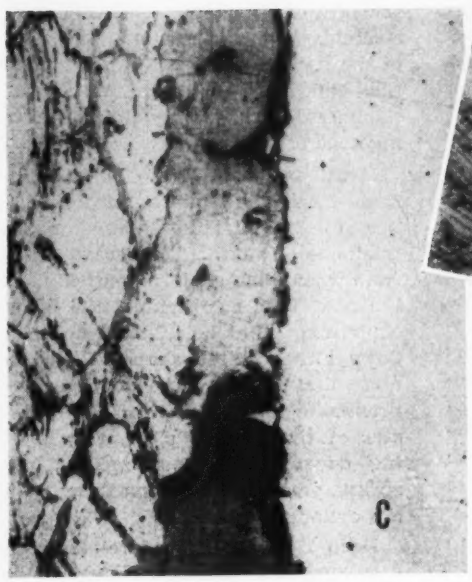
STUDY of factors affecting the stabilization of 18-8 stainless steels to determine the relative amounts of titanium and columbium necessary for effective stabilization, the injurious effects of carbon content, and the necessity for stabilizing heat treatments was conducted recently for the Bureau of Aeronautics, Navy Department, by National Bureau of Standards, Washington. Experimental and commercial steels made to a base analysis of 18 per cent chromium and 10 per cent nickel were used in the study.

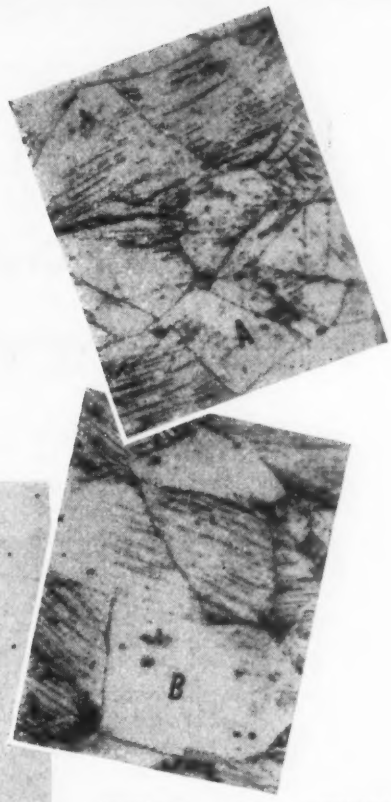
Test ordinarily used to induce susceptibility to intergranular attack consists of heating the steel for 2 hours at 1200-1250° F and is followed by exposure for 2 days to a boiling solution consisting of 100 milliliters H_2SO_4 (specific gravity 1.84), 100 grams $CuSO_4.5H_2O$, and 900 milliliters distilled water. Specimens are then dropped on a steel plate to note whether they have lost their metallic ring, and are bent over a rod whose diameter is equal to their thickness. Outer fibers are then examined for cracks.

Steels which are immune to intergranular embrittlement have an unimpaired metallic ring and show no cracks after bending. Extremely susceptible steels lose their ring completely and crumble on bending. In addition, all specimens studied were subjected to metallographic examination as well as a measurement of electrical resistivity, since intergranular corrosion increases this property considerably.

Method of Sensitizing—Specimens were sensitized at temperatures ranging from 840-1380° F for periods up to 21 days, followed by exposure to the boiling acidified copper sulphate solution for 14 days. The most severe sensitizing treatment was 8 or 21 days at 1020° F. Compared with this, the commonly specified treatment of 2 hours at 1200° F is relatively mild.

Steels which contained no stabilizing elements were all vulnerable to intergranular attack. Decrease in carbon content, however, decreased the degree of vulnerability.





Specimen A was sensitized for 2 hours at 1200° F and specimen B for 2 days at same temperature. Left side of micrograph C shows specimen A after it had been exposed to boiling copper sulphate solution for 2 hours. Right side of micrograph C corresponds to specimen B after exposure to boiling solution for 12 days

Influence of Carbon—In the columbium and titanium bearing steels, carbon content within the range of 0.06 to 0.13 per cent had no influence upon the resistance to intergranular attack except as it influenced the columbium or titanium to carbon ratios. Steels when annealed at 1800° F showed greater resistance to attack than those annealed at 1975° F.

Columbium treated steels carrying a sufficiently high ratio of columbium to carbon may be used without giving them a stabilizing heat treatment. Performance of titanium treated steels carrying the higher ratios of titanium to carbon was markedly improved by heat treatment. When properly treated, substantially complete immunity to intergranular attack may be obtained with a minimum ratio of columbium to carbon of 10 to 1 and titanium to carbon ratio of 5 to 1. For more "fool proof" immunity these ratios should be 12 and 8 respectively.

Effect of Carbides—Type of distribution of precipitated carbides resulting from the sensitizing treatment was not an infallible indication of the resistance to intergranular embrittlement. Steels in which carbides were distributed randomly were usually resistant to intergranular attack. However, steels that contained carbides at grain boundaries, even though these carbides were distributed as a continuous network, either were or were not susceptible to intergranular attack depending on time temperature relationship during sensitization.

For example, two specimens of a straight carbon (0.09 per cent) austenitic steel, one sensitized 2 hours at 1200° F and the other 2 days at the same temperature, were indistinguishable on examination of their microstructure, accompanying illustration A and B. Both show a precipitation of carbides at grain boundaries and on various slip planes. After exposure to boiling acidified copper sulphate, however, specimen at the left, C, that had been sensitized 2 hours suffered severe intergranular corrosion after 2 days exposure. Specimen on the right, C, which was sensitized for 2 days showed no evidence whatever of corrosion after 14 days.

METAL STAMPINGS

For Ordnance

. . . held to be answer to many needs of armed forces

ARMY and Navy ordnance designs should be set up to take advantage of the mass production facilities of industry in time of war, stated Howard C. Wolf, assistant to the president, Mullins Mfg. Corp., Salem, O., in an address delivered recently at U. S. Naval Ordnance Laboratory, White Oak, Md. He strongly urged that every time a development design is drawn up, consideration be given as to how the same design would be produced requiring the least amount of raw material and fewest possible man hours in volume production. He reminded the audience of naval personnel that minute differences between identical items being supplied for the Army and Navy reduced the maximum advantages possible with mass production methods during the early part of the last war.

Metal stampings are the answer to higher production and lower costs in many instances, Mr. Wolf stated, and are particularly useful when lighter equipment is needed. Fine technical details of metal stamping processes such as tolerances, spring backs, tonnages of press equipment, etc., should be taken up on a classroom basis and literature which gives basic knowledge of what metal forming equipment will do and formations that metal will take should be consulted. The explanations of some of the processes used in the stamping or pressed metal industry, which follow, were given by Mr. Wolf so that his audience could better understand what industry could do in time of an emergency.

Cold Forming—This operation consists of elementary bending and braking operations. The ordinary V-bend and channel-shaped pieces are the most common examples. No transposition of the metal takes place, and there is only a slight elongation of the metal, at the outside of the bend.

Drawing is best characterized by a cup-shaped piece, or by a pan with rounded, solid corners. In drawing, contrary to the general impression, the metal is transposed, not stretched, from the flat to the cup or pan shape. As the action takes place between the yield strength and the ultimate strength of the metal, relatively little stretching takes place, and the area of the finished piece is a little greater than that of the blank. Likewise the thickness is practically uniform, being that of the blank.

Metal is pushed into a suitably shaped hole by a punch, shaped similar to the hole but smaller by thickness of stock. To prevent metal from wrinkling as it is pushed into the hole, it is held against the block containing the hole, and actually flows into required shape. In moderate draws, where the depth is approximately one fourth of the diameter of the finished piece, this holding down can be accomplished by spring pressure or by pressure from air cylinders.

Deep Drawing Procedure—In deep drawing the action is the same as in drawing, but the depth may be greater, approaching three fourths of the diameter. In this case the holding down pressure must be accomplished by positive means instead of by spring or air. It is supplied by linkage built into the press and operating a slide independently of the slide to which the punch is mounted. It is so timed as to come down ahead of the punch slide, and remain stationary as the punch descends into the work and withdraws. Such a slide is called an outer, or blankholder slide and forms a ring around the punch or inner slide. Press so equipped is known as a double action press. Examples of this operation would be washing machine tubs and the automobile fender.

Special case of drawing is cupping, where the thickness compared to the diameter is so great that the wrinkling does not occur and no hold-down is required. An example of this is the first operation in making cartridge cases.

Ironing operation is distinguished by the fact that the preliminary working stress is compressive and the blank or slug is cast directly between the punch and the die. Ironing is the reduction in thickness of drawn shell walls by passing them through dies. It is used to obtain a uniform wall or a tapered wall as in cartridge cases. In this application, a cup is successively put through ironing dies, the walls becoming progressively thinner but the bottom remaining unchanged in thickness.

Cold Extrusion from Bar Stock—Cold extrusion from bar stock has come into great prominence during and after the war. German engineers made considerable strides in this process because of their shortage of materials. They found that with the right lubricant, or drawing compound, metal will move in the desired direction. Limitation in this process in the past was the adhesion of the metal to the die, causing a galling condition.

Pressure or abrading action here is so great as to wipe any lubricant from a smooth surface, but a surface suitably etched or roughened can retain the lubricant, thus making extruding possible.

Hydrogen Brazing—Spot and arc welding processes for joining metals are most common, but a discussion of these two methods seems unnecessary. Hydrogen brazing was introduced just before the war and has arrived as a recognized welding method because of the number of uses that have been found for it. Process involves fastening two pieces together in various forms and passing them through a controlled atmosphere at approximately 2050°F, establishing a bond. Excessive amount of hydrogen in furnace eliminates oxidization of metal, resulting in a bright finish.

An example of a conversion made during the war is the trigger housing for the 30 calibre carbine. Redesign of the part into a stamping assembly using fourteen different stampings all brought together at one time by the use of hydrogen brazing reduced the original cost per unit from approximately $6 down to $2. This saving was impressive because 1.2 million parts were made to this design.

New Fields for Alloy Steel—New uses of alloy steel sheet and strip offer an entirely new field for development and design engineers. The greatest possibility of forming these materials into stampings is in their possible combination with each other. They can be welded or brazed together and subsequently heat treated to bring physical properties up to the point formerly possible only with forgings. An operating slide for the 30 calibre carbine was made up of

(*Please turn to Page* 140)

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Lathe Facing Fixture

Jumps Percentage of Production Time

Single motion holding action reduces nonproductive time to a minimum, locates parts accurately and holds them rigidly

By ROBERT MAWSON

WHEN designing any special manufacturing piece of equipment, one of the important principles to remember is to have the idle or nonproductive time as short as possible. Only a tool which can produce work all the time, whether it is a lathe, milling machine, drill press or any other machine tool, can be considered 100 per cent efficient, and that is "something to shoot at."

Therefore, to approach this objective, tools should be designed so that the workpiece can be located, fastened in place and removed from the tool in the shortest amount of time Quick acting workpiece locating, holding or removing details on a tool increase the percentage of production time and the result is a more desirable piece of equipment.

Fig. 1 shows a traverse bar lever driver that is used in textile machines. It is made of cast iron. Machining operations are: Boring the inside, drilling the small hole which later is counterbored and facing the two ends so that they will be equidistant from the drilled and counterbored hole.

Fixture Description — These facing operations are performed in a lathe. The fixture used is shown in Fig. 2. It has a cast iron body "A," finish machined on the surface indicated. The left hand of this body is bored and threaded to fit the spindle of the lathe.

In the center of the body is a hole into which is driven the steel pin "B." Its projecting end is machined for a sliding fit in the bore of the workpiece. Tool steel pin "C" in turn is driven into pin "B" so as to extend approximately 1 inch from each side. Then at outer end of pin "B" is placed tool steel spacing pin "D." This is provided with two flat surfaces of proper length to fit between the openings of the two workpieces when they are mounted in the fixture.

Assembly also includes cast iron yoke "E," finished on its two vertical surfaces to a sliding fit on the fixture body. In its vertical walls are slots machined to sliding fit for pin "C." In the bottom wall of the yoke a hole is drilled and reamed. In it is placed a tool steel button head pin "F." Square headed set screw "G" is tapped into wall of yoke.

Locating Plugs — Hardened tool steel locating plugs "H" are driven into two holes in the fixture body. Outside ends of these plugs are then ground flush with the outside surface of body. Two slots are machined in body for the case hardened machine steel jaws "J." These jaws which are sliding fits in their respective slots, swing on steel pins "K." Tension springs "L" are set into reamed holes in the body so as to contact inside surface of jaws.

This turning fixture is screwed onto the spindle of the lathe. Set screw is then unscrewed and as its pressure is removed the two jaws are spread by the tension springs. As the jaws open, yoke moves on the pin "C."

Workpiece Clamping — Two workpieces are now placed facing each other on pin "B." They are pushed down against plugs "H" with pin "D" setting between their edges. Set screw "G" is then tightened thus drawing the jaws together. This simultaneously clamps and locates the workpieces. A hardened tool steel width gage is then placed on the outside face of the fixture body. The turning tool moves up to the face of this gage block, which is then removed, the lathe started and outside surfaces of the workpiece are faced.

Width of the gage used to set the tool for this first operation is 1.254-inches plus amount of materials left for finish on one face of the work. After this turning operation set screw "G" is released allowing jaws to be opened by tension springs.

Workpieces are then removed and reversed in the fixture. Finish operation gage is placed again on the outside face of fixture body and the turning tool brought against its face. Gage is then removed and surfaces of the workpiece are faced. Gage used to set for this operation is 1.254 inches wide.

This interesting facing fixture locates parts accurately and holds them rigidly. Its single motion holding action reduces the nonproductive time to a minimum thereby making the fixture deserving of attention as an efficient piece of production equipment.

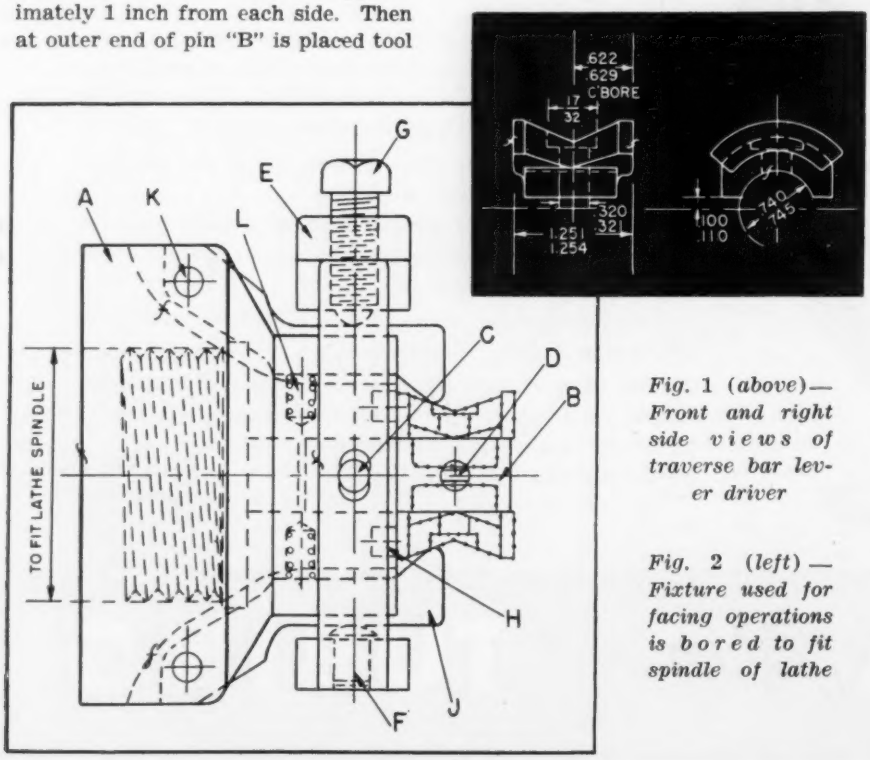

Fig. 1 (above)— Front and right side views of traverse bar lever driver

Fig. 2 (left) — Fixture used for facing operations is bored to fit spindle of lathe

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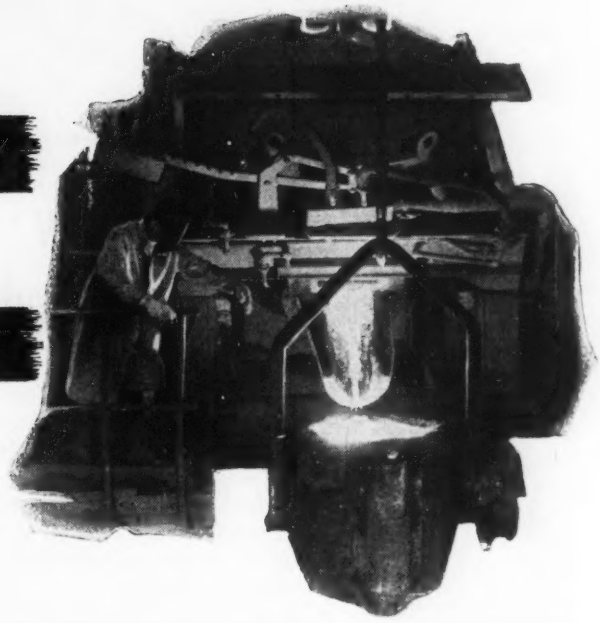

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Stainless Clad Steel

(*Continued from Page 96*)

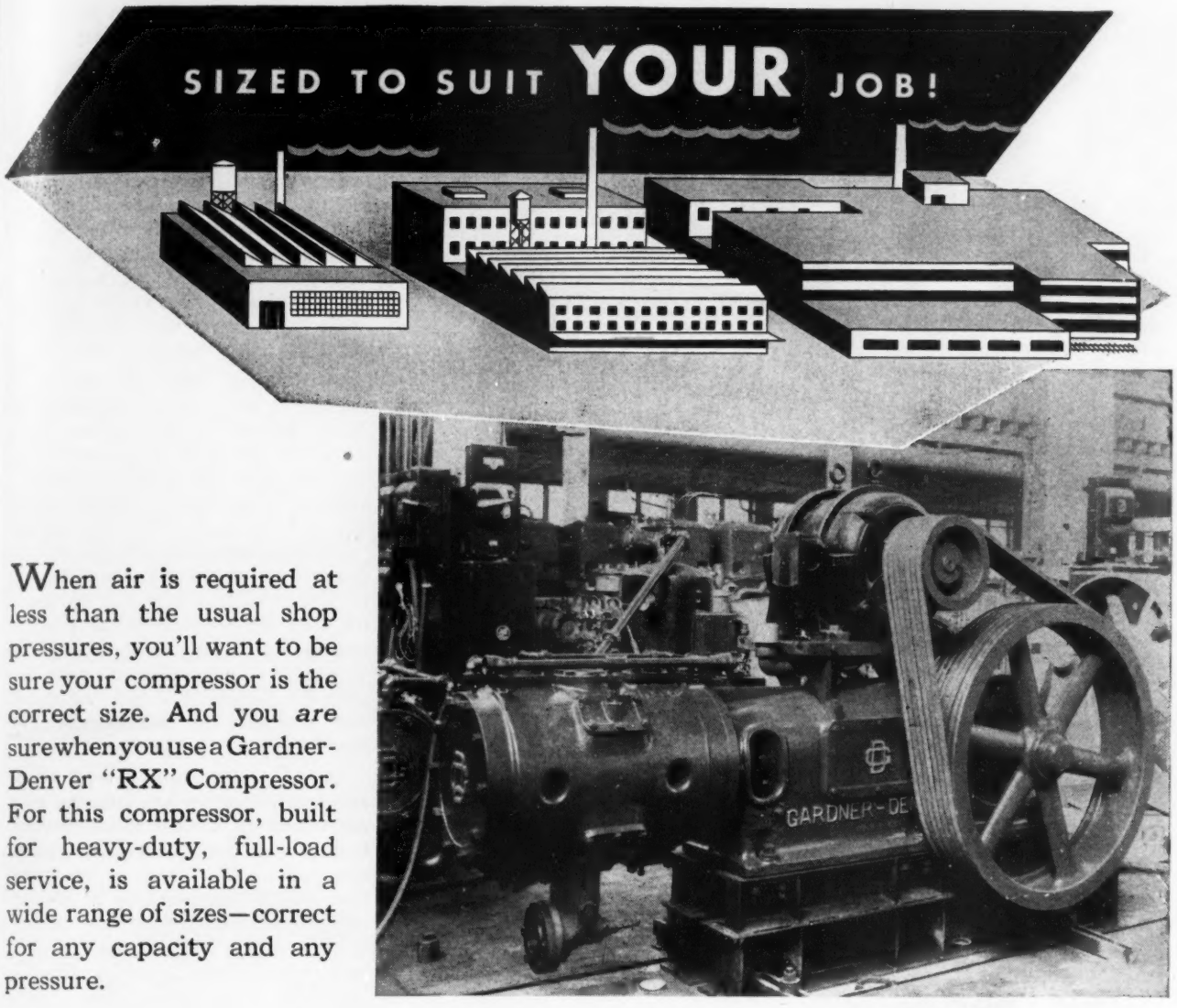
tion of course must be predicated on a particular application. Several manufacturers of mar-proof coatings are familiar with stainless-clad and are qualified to furnish dependable recommendations on die lubrication in connection with its forming.

Polishing and buffing operations should be conducted, following procedures recommended for stainless steel, when finishing clad sections. It is essential that iron-free abrasive be used and that the polishing and buffing operations be performed in such a way as to remove a minimum and uniform amount of metal over the stainless surface. Excessive metal removal in angular areas leads to the possibility of grinding through the cladding and a subsequent patching operation in the denuded area.

With proper procedure, a beautifully lustrous finish can be obtained with the use of stainless clad materials, as is evidenced by the many complicated and sizable sample sections produced experimentally in the form of hub caps, bumpers, bumper guards, gravel guards, grilles, grille guards, and other utility and ornamental automobile hardware. The finish obtainable with Permaclad is repairable and can be rebuffed; if torn, it can be welded and refinished without impairing the original beauty and usefulness.

One of the problems which must be considered on a finished clad section is iron contamination. This condition is well understood by those versed in the handling of stainless-clad. However, shops experienced only in plated sections do not understand this condition and many misleading and confusing conclusions may be reached due to the superficial deposition of iron contamination on the stainless surface during the finishing operations. This contamination is not apparent until after moisture oxidizes the deposit of iron and gives the impression that the stainless steel is rusting. It has been found that this apparent rusting can be cleaned with a dilute nitric solution, or can be removed mechanically with an iron-free buffing pad.

Best means of eliminating iron contamination is in conjunction with painting the back of the section. After the drawing operation, the blanked piece of clad metal has a sheared edge that is part stainless cladding and part open-hearth steel backing. It is necessary to apply the proper protective coating to this



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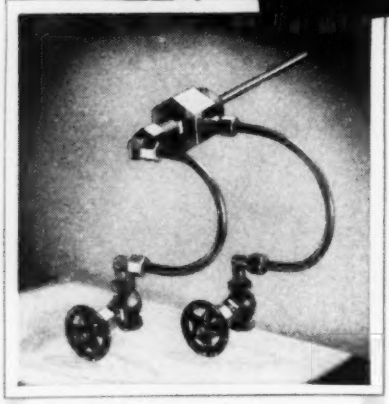

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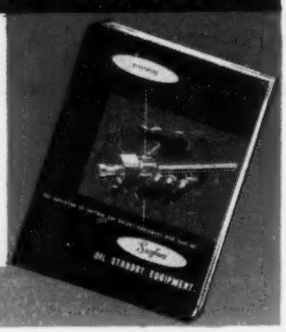

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sheared edge, as well as to the backing side. In preparing for deposition of the proper paint or coating, the sections are degreased and bonderized following the regular procedure. The hot degreasing solution plus the bonderizing is usually sufficient to remove any iron contamination from the stainless surface and thus eliminate this condition. With the proper fixtures, a metal lacquer along with leafing aluminum can be applied to the back and oversprayed on the edges in such a way as to meet standard salt spray tests.

Stainless-clad material has been considered seriously for applications in the automotive and architectural industries for some time. However, the cost of material, until recently, made it economically unfeasible to plan on using stainless-clad. With the very substantial increase in the proportion of the finished cost of various sections attributable to labor, the wide difference in material costs has been minimized. With labor costs increasing, while material costs remain comparatively stable, this trend will warrant the consideration of clad metal for production items.

At the present time several truck and bus companies are ordering clad sheet material for use in the production of gas tanks, bumpers, guards and grilles. Clad sheet is also being used in the manufacture of shower stalls, back bars, sink tops, refrigerators, water coolers, and various architectural and appliance items.

British Group Publishes 1946 Iron, Steel Yearbook

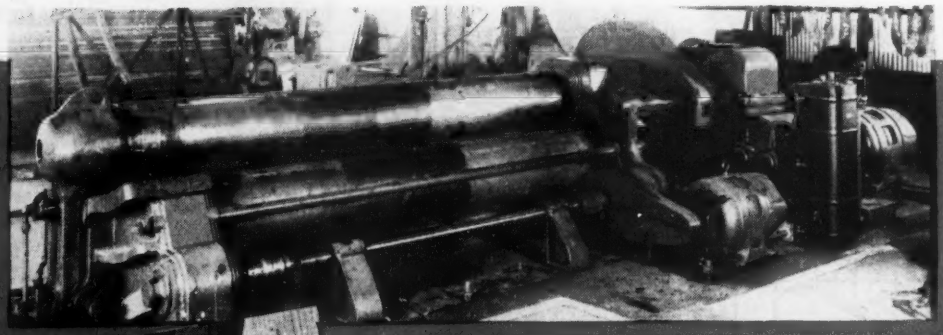
Publication of the British Iron & Steel Institute's statistical yearbook has been resumed, and the 329-page volume, covering the year 1946, gives for every steel producing country statistics on production, imports and exports, materials consumed in the production of pig iron, steel ingots and steel castings, etc.

At the end of the book are world tables on production of iron ore from 1929 through 1946, pig iron and ferroalloys for 1866, 1870 and the period 1875-1946, and steel ingots for the same years. Actual output of steel in all countries, with the exception of Russia, during World War II is also included. Russian production since 1941 is estimated.

The price of the book is 15 shillings ($3.00), plus postage.

—o—

American Iron & Steel Institute, New York, recently issued a revised edition of its steel products manual on concrete reinforcing bars.



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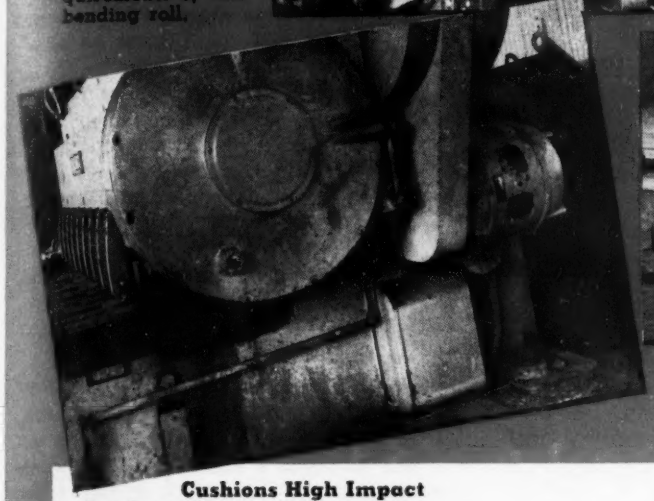
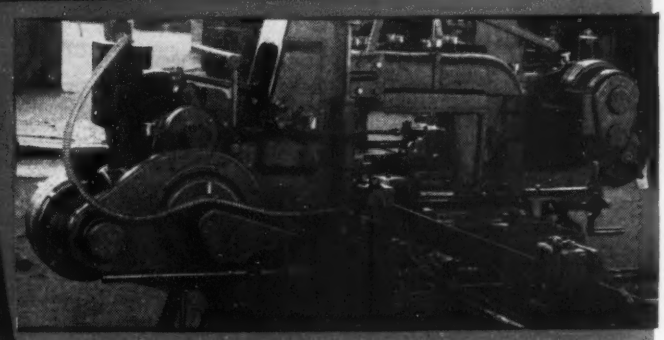


Cushions High Impact Loads — Century 40 horsepower SCT motor slows down, cushions the impact of shearing or forming.



Provides Smooth Continuous Power — Century 2 horsepower SC motor supplies power for this steel cutoff saw.

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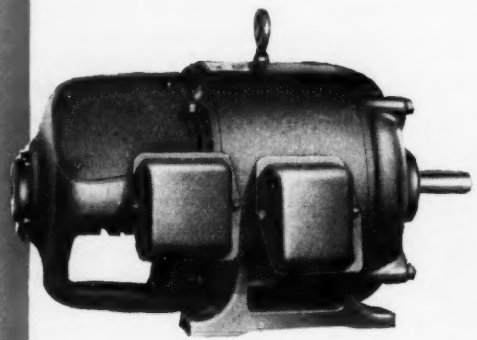

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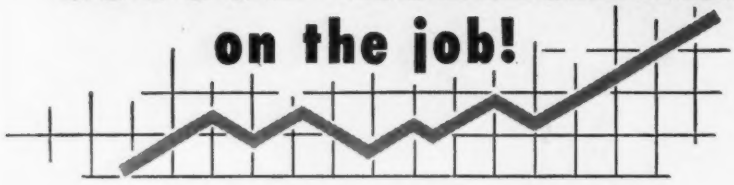

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Tin Plate Gages

(*Continued from Page* 111)

ploys it as an additional check on the soundness of forged sleeves and arbors. The instrument affords maximum assurance of metal soundness by providing readings circumferentially and longitudinally on the forged sleeves.

Manufacture of sleeves, as previously indicated, now follows a positive procedure. This starts with casting the proper size ingot from an acid open-hearth furnace.

The ingot is longitudinally forged into a billet with a minimum of two by one reduction. It is then upset forged to approximately 50 per cent of its length. A hole is then punched longitudinally through the ingot for mandrel forging, which forging permits thorough reduction and grain refinement throughout the entire cross section of the work. An annealing treatment follows.

After rough turning, a special quenching and tempering treatment is given to secure desired hardness, and to leave a minimum of internal strain. The superiority of this type of treatment for back-up roll sleeves is due to the hardness that may be obtained, as well as the fact that hard cementite particles which are distributed uniformly throughout the steel contributes to better wear resistance.

The inside diameter of the forged sleeve is then ground, leaving proper allowance for shrinkage of the sleeve on the arbor. This operation is of special importance. The sleeve is heated to the proper temperature and then shrunk on the arbor which has been ground to the correct size. It actually rests against the shoulder of the arbor. After shrinking, a lock ring is generally installed to prevent any lateral movement of the sleeve on the arbor when in service. Careful controlled shrinkage prevents the sleeve from moving circumferentially. The composite roll, consisting of arbor and forged sleeve, is then machined to the desired size. Carbide tooling is used.

Selection of proper hardness for a roll sleeve is considered of utmost importance. Heppenstall metallurgists find that high hardness minimizes spalling. However, it also materially increases failure by splitting. Too soft a sleeve may promote spalling.

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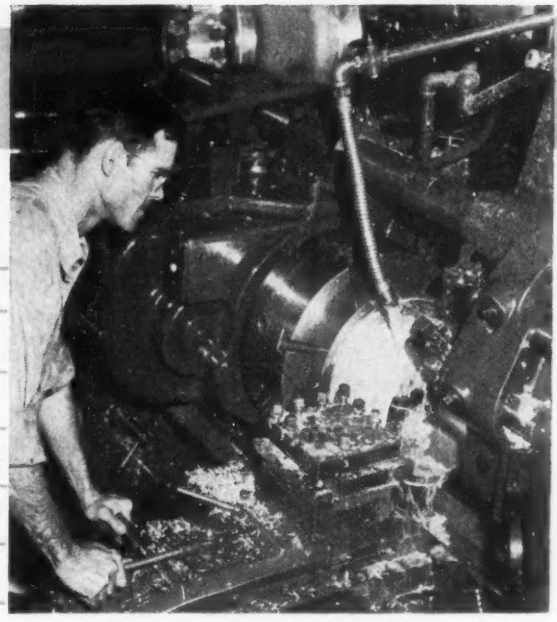

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**In 1924, basic patent No. 2,097,253 was issued to Newcomb-Detroit Company on the first water curtain spray booth.*

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operation, and judgment of the mill operator.

It is generally conceded that sleeve service in a hot mill is not as severe as in a cold mill. Consequently, hardness required for a hot mill is not quite as high. The hardness for hot mill sleeves generally falls between 50 and 55 scleroscope. Cold mill sleeves usually vary between 55 and 60 scleroscope.

At Heppenstall, composite rolls are fabricated from worn-out solid back-up rolls sent to its plant, or from arbors received after customers have turned them down to specified size. The plant also produces these composite back-up rolls using its own forged arbors and sleeves. Thus far, some mills have resleeved the same arbor three, four and five times.

Hardness of a forged and heat treated arbor varies according to size, with an average hardness between 35 and 45 scleroscope.

Sleeving Economical Operation

According to company spokesmen, consensus of the company is that it is generally less expensive to sleeve a worn-out cast back-up roll than to purchase a new cast roll. To sleeve a worn-out back-up roll, which otherwise would be scrapped, it is explained, the body of the solid roll must be turned down in a lathe to arbor size and shipped to Pittsburgh. Then, the proper sleeve is forged and assembled on the arbor. This is usually done in less time than a new roll can be delivered and at less expense.

There are said to be rare instances in which a forged sleeve, assembled on a worn-out back-up roll, will cost as much or even slightly more than a new roll. However, in the company's experience, this condition has not detracted from gaining new users of sleeved back-up rolls. Additional tonnages obtained, and the resulting lower unit cost, more than offsets sleeving cost, it is felt.

—o—

Complete proceedings of the spring meeting of Metal Powder Association, New York may now be obtained. The following papers with full discussions and illustrations are included in the volume: Controlled Atmospheres for Sintering, Metal Ceramics—A New Branch of Powder Metallurgy, Compressibility Factor for Metal Powders, Tooling for Powdered Metal Parts, Iron Powder in Electronics, Testing of Metal Powder Bearings, Sintering of Brass Compacts and the luncheon address by George G. Ensign.

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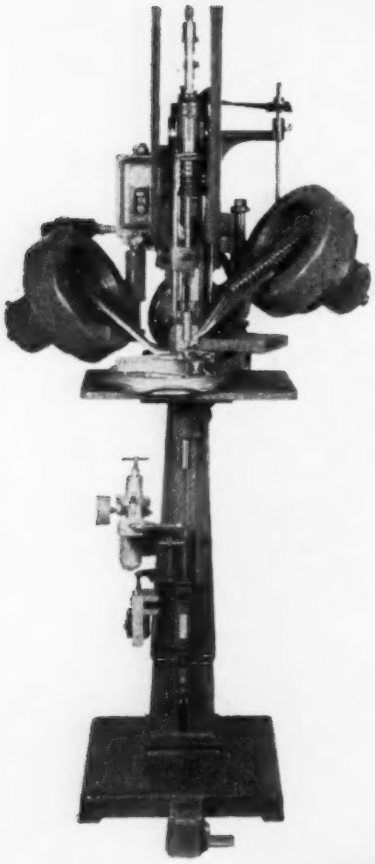

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X-Ray Metallography

(*Continued from Page* 117)

A, B, C in Fig. 2 are found as follows:

Here, p = 2, q = 3, r = 1, and n = 1, and:

$$h = qr = 3$$
$$k = rp = 2$$
$$l = pg = 6$$

Therefore, the plane ABC described by its Miller indices is 3, 2 and 6. Therefore, a plane having intercepts:

$$\frac{a}{h}, \frac{b}{k}, \frac{c}{l}$$

has the Miller indices h, k, l. A plane having intercepts 2a, 3b, 1c is therefore written:

$$\frac{1a}{2}, \frac{1b}{3}, c$$

$$\frac{3a}{6}, \frac{2b}{6}, \frac{6c}{6}$$

The Miller indices are 3,2 and 6. By following this simple procedure one can easily find the Miller indices when the intercepts are given, for example when a = 2, b = 2, c = ∞:

½a, ½b, 0 (the reciprocal of ∞)

or the 110 plane (and the 100 plane).

b = ∞ and c = ∞

The reciprocal of these intercepts is as follows:

$$\frac{1}{a} = 1 \; ; \; \frac{1}{c} = \frac{1}{\infty} = 0 \; ; \; \frac{1}{b} = \frac{1}{\infty} = 0$$

The three fundamental cubic lattices are shown in Fig. 3. Notice that the distances a_o are between successive layers of atom points. The value a_o is given in tables of lattice constants. When this is given the other planar distances can easily be calculated.

Miller Indices Applied to Cubic Lattices: Any plane in a cubic lattice can be described simply in terms of the Miller system of indices. It has been found by experiment that the following atomic planes are associated with various physical characteristics. The following atom planes are the most important:

In Alpha Iron (body centered cubic)	
Planes	Characteristics
(110)	Slip planes
(211)	Twinning planes
(100)	Cleavage planes
In Copper (face centered cubic)	
(111)	Slip planes
(211)	Twinning planes

Face and Body-Centered Cubic Lattice Systems: Metals belonging to the cubic system either crystallize in the face-centered cubic or the body-centered cubic shown in Fig. 3. No metal is known to crystallize in the simple cubic. This does not effect the Miller indices which remain the same for all three cubic lattice structures. The type of space lattice does modify the slip plane and the direction of plastic flow, as just indicated. Table I gives the type of space lat-

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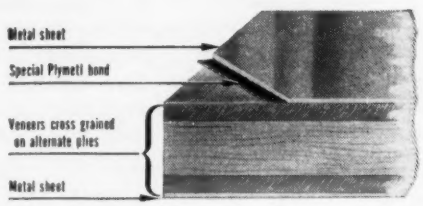

Plymetl consists of light gauge metal sheets permanently bonded to one or both sides of a plywood panel. Sheets of zinc coated steel, aluminum or other metals may be used. One type of material may be bonded to one side of the panel, and another type to the other if desired. Panels of Haskelite Plymetl are easily fabricated with simple metal or wood working tools. It may be obtained in a range of thicknesses and sizes to fit specific requirements.

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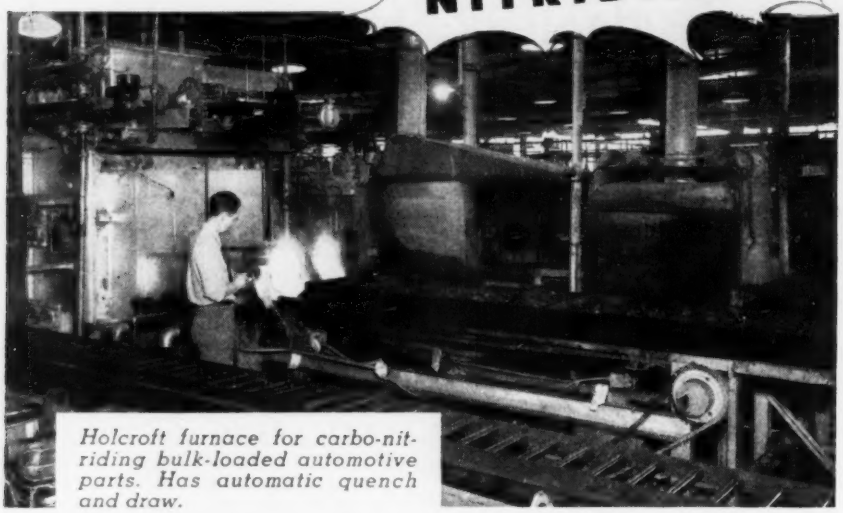

Holcroft furnace for carbo-nitriding bulk-loaded automotive parts. Has automatic quench and draw.

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TABLE I

TYPE OF SPACE LATTICE TO WHICH COMMERCIAL METALS BELONG

Metals having face-centered cubic space lattice

Element	a_0
Aluminum	4.04
Calcium	5.56
Iron, gamma	3.63
Cobalt	3.51
Nickel	3.50
Copper	3.60
Silver	4.08
Platinum	3.91
Gold	4.06
Lead	4.92
Thorium	5.04

Characteristics: 1. Good ductility, 2. Malleable, 3. High electrical conductivity.

Metals which recrystallize in body center cubic type space lattice

Element	a_0
Sodium	4.30
Potassium	5.20
Vanadium	3.04
Chromium	2.87
iron, alpha	2.855
iron	2.93 (1425° C)
Molybdenum	3.143
Tantatum	3.272
Tungsten	3.155

Metals which crystallize in hexagonal system

Element	a_0	Axial ratio
Beryllium	2.28	1.58
Magnesium	3.20	1.62
Titanium	2.97	1.59
Cobalt	2.51	1.63
Zinc	2.66	1.86
Zirconium	3.23	1.59
Cadmium	2.97	1.89

tice to which the commercial metals belong as well as their lattice constant a_0.

Calculations of Lattice Parameter: The crystallographer defines a crystal as a solid body bounded by polyhedral faces, the arrangement of which depends upon the crystal class to which it belongs. Substances which are not considered crystalline are amorphous, that is, without form.

In 1891 Schoenfliess and others, independently of him developed the theory of space groups. On purely theoretical grounds it was shown that faces of crystals can only be arranged in 230 ways and that 32-point groups and only 14 lattice systems are possible. This number could be further reduced to six lattice systems from symmetry considerations. These results of pure mathematics applied to crystal symmetry are remarkable in that actually nothing was known about the internal structure of matter since the theory was developed entirely from the external characteristics of crystals found in nature.

The conceptions of crystal structure prior to the advent of the x-ray, starting with Hauy (1743-1822) and climaxing with the theory of space groups by Schoenfliess and others (1891), developed the mathematical theory of the lattice structure to a remarkable degree of perfection.

About 1912, Laue, a German physicist, conceived the idea that crystals may be considered to be a 3-dimensional lattice grating. He based this idea on the work of the mineralogist Bravais (conducted about 1850) who

had postulated that the atoms in a crystal were arranged with more or less regularity on some kind of lattice structure. Laue also knew that Roentgen and others had made attempts to measure the wave length of x-rays but found to their surprise that they did not obey the ordinary laws of optics. It was for this and other reasons that they were called x-rays.

However, indirectly, and by crude experimental methods, the new radiation seemed to behave in a wave-like manner, similar to ordinary light, but of extremely short wave length—of the order 10^{-8} centimeters. Ruled gratings were also tried, but the spacing between the lines ruled on the surface of the grating block was entirely too far apart (Ruled gratings have 14,000 to 40,000 lines to the inch, or about 6.7×10^{-5} centimeters). The gratings are used in analyzing the wave lengths of ordinary light since the line spacing is of the same order of magnitude as the wave length of ordinary light (about 10^{-5} centimeters). To diffract x-rays the lines would have to be spaced in the neighborhood of 10^{-8} centimeters apart, but this is beyond all mechanical possibility.

Even before this discovery it was known that the spacing of the lattice planes of NaCl was of the order of 10^{-8} centimeters apart.

The lattice dimensions were calculated in the following manner and independent of x-ray methods:

1. From mineralogy we know that the structure of rock salt, NaCl, is cubic.

2. The lattice parameter of the unit cell can be calculated using the following equation:

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

$$\text{Density} = \frac{\text{Mass of atoms}}{(\text{Lattice spacing})^3 \quad (\text{Dimension of cube edge})}$$

Expressed mathematically:

$$\rho = \frac{Mm}{(a_0)^3}$$

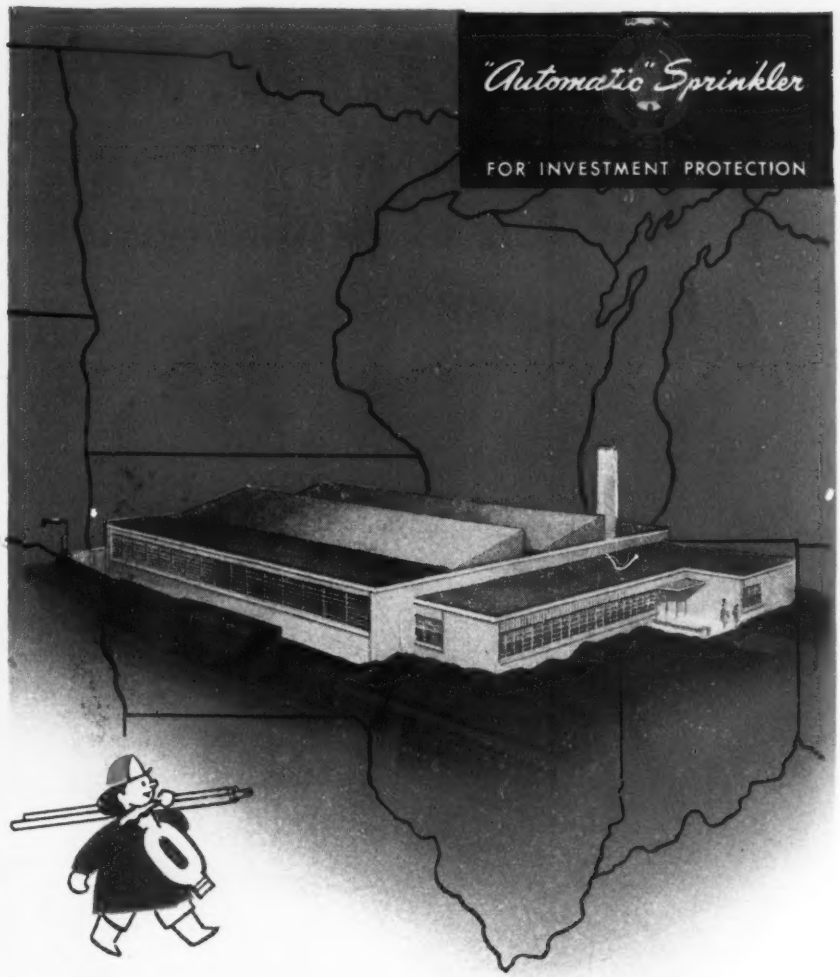
Where:

ρ = Density of the crystal
M = Molecular weights of the atoms of Na and Cl
m = Mass of the hydrogen atom 1.662×10^{-24}
a_0 = Spacing between atom planes parallel to cube faces
$_0$ = Symbol adopted by convention to represent the cube face, called a Miller indices.

The mass of the Na and Cl atoms therefore is

Na = 22.997
Cl = 35.457
NaCl = $58.45 \times 1.662 \times 10^{-24}$

Since the unit cell of the NaCl molecule can only contain a single atom the mass of the NaCl must be divided by two to calculate the lattice parameter of the smallest possible element of the lattice. Obviously the molecule of NaCl is larger and



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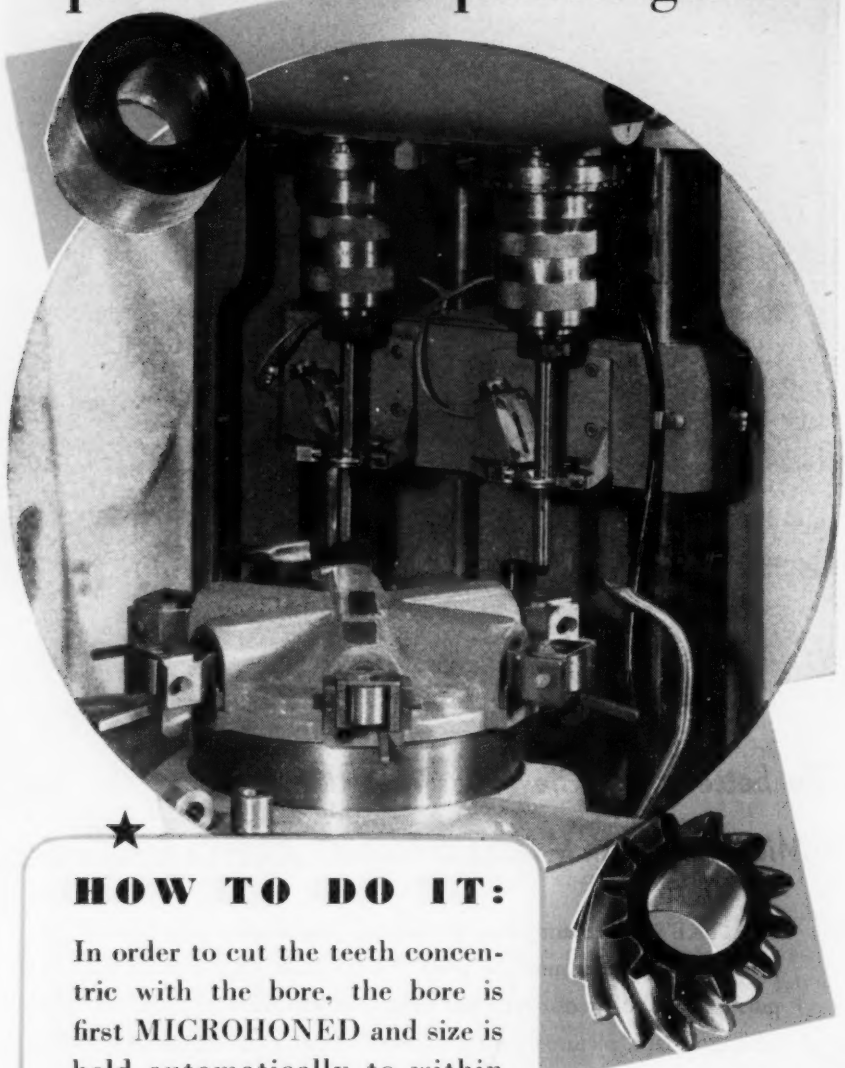

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must be at least twice as large. The reason for this is as follows. A unit cell of a simple cube has an atom situated on each corner (8 atoms). Each of these corner atoms is shared by eight other cubic cells; therefore a unit cell has but one atom per cell. Since NaCl consists of two different atoms, Na and Cl, a unit cell can either contain one or the other and for the purpose of calculation the average mass of the atom is used. It should be pointed out that the lattice structure of a molecule is perfectly arbitrary and has been accepted by convention. The structure of NaCl is shown in Fig. 4.

To calculate the parameter (a_o) the average molecular weight of the NaCl molecule is used. Therefore,

$$\frac{Mm}{2} = \frac{58.45}{2} \times 1.662 \times 10^{-24}$$

$$\frac{Mm}{2} = \text{Average mass of unit cell}$$

With the mass of the molecule of NaCl known, the density can be measured precisely for an individual crystal. The parameter of the cell (a_o) then can be calculated from the equation already given:

$$a_o = \sqrt[3]{\frac{Mm}{2\rho}}$$

$$= \sqrt[3]{\frac{58.45 \times 1.662 \times 10^{-24}}{2 \times 2.17}}$$

$$= 2.81 \times 10^{-8} \text{ centimeters}$$

Once the lattice constant of a crystal is known the wave length of the x-ray radiation can be determined, as suggested by Laue, since the lattice constant of NaCl is of the same order of magnitude as the x-ray radiation, that is, about 10^{-8} centimeters.

As a rule NaCl has not been extensively used for this purpose since the density varies from crystal to crystal due to slight variations in chemical composition. Moreover, the crystals contain many internal flaws or imperfections. For accurate determinations of x-ray wave lengths more perfect crystals must be used.

Calcite appears to be more perfect than other crystals in that the density varies but slightly from crystal to crystal even when they originate from a wide variety of sources. This means that the density can be determined not only with greater accuracy but also with more certainty. The crystal structure is, however, more complex being rhombic, belonging to the hexagonal system. Its freedom from the many imperfections makes it possible to calculate the lattice parameter or the spacing between the cleavage faces with great precision with the result that accurate wave length determinations can be made. This is important be-

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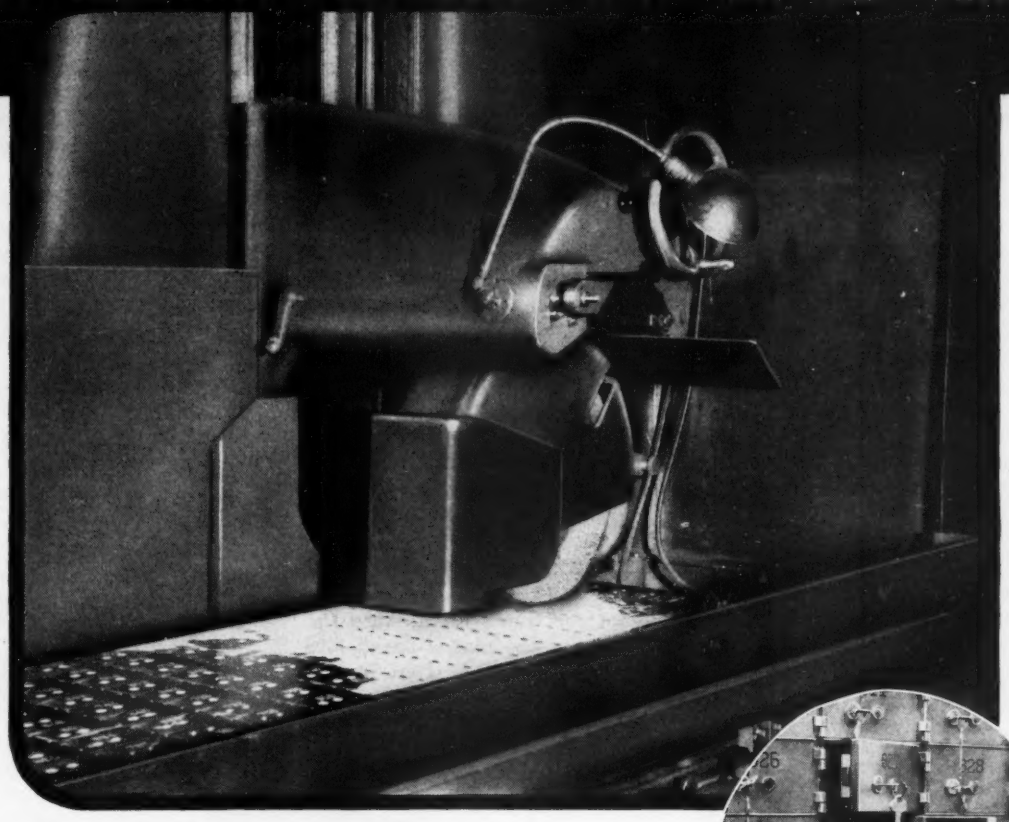

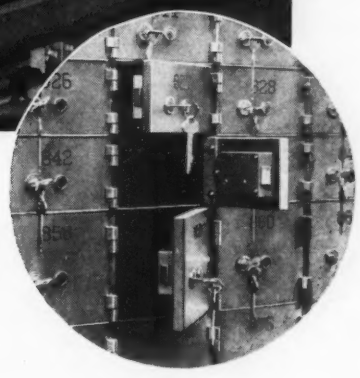

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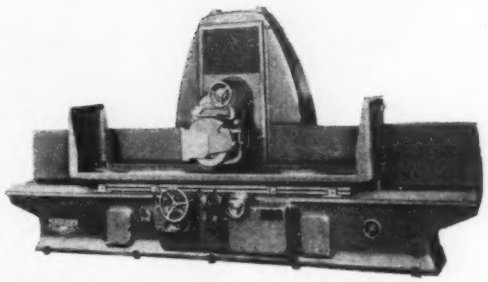

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cause in the study of alloys it is essential that the wave length of the x-ray radiation used be accurately known so that slight changes in the lattice parameter can be measured as the composition of the solid solution is varied especially when the changes in parameter are small over wide ranges of composition.

As a rule the density of crystals of the same substance may vary considerably. The manner in which the specimens are grown or prepared appears to effect the density. It should be stressed that the density of any given specimen can be measured with great precision but its value may be in great error due to internal flaws. This accounts for the wide variation in density determinations reported in the literature. The experimental determination is accurate but the internal imperfections, beyond the control of the investigator, cause the density determinations to be inaccurate. So with proper technique the x-ray method should be more reliable than other methods because the effect of internal imperfections such as flaws, mosaic, etc., can be eliminated.

Density of a single crystal of pure iron may be 7.870 and that of the polycrystalline iron of the same material may be 7.867, about 0.04 per cent less. Maier found the same to be true of copper. He reports the density of copper at 20 degrees Cent. when melted and solidified in vacuum is 8.9415; with helium applied under pressure during cooling it is 8.9433. A single crystal made of this same melt has a density of 8.9529. The copper melted under pressure was less porous and therefore of greater density. Generally the single crystal has a greater density than the polycrystalline since it has less internal surface. This will be discussed in a later section. It, therefore, is evident that the density of a metal is not a function of the lattice parameter alone but depends upon other factors such as flaws, pores, internal surface, etc.

Like copper it is difficult to determine the true density of pure iron or steel. However, since iron is one of the most useful metals it will be advantageous to determine its lattice parameter purely from density determinations and to gain a knowledge of its atomic weight and crystal form. The lattice parameter to be calculated for iron will measure the space between the planes parallel to the cubic faces or the (100) planes. Later the values obtained by this method will be compared with those determined by the x-ray diffraction method. It is believed that the reader will gain a better insight of the internal structure of matter when described in more familiar terms such as density, molecular weight and the mass of the hydrogen atom, and then show how it is carried out by means of x-ray diffraction methods.

Like salt (NaCl) the structure of iron is cubic; it differs from rock salt in that it is necessary to have two atoms in the unit cell since it is not a simple cubic. In iron an atom is located at each corner and one at the center. If this assumption were not made the density calculations would not check with the lattice parameter. The structure of the iron lattice is shown in Fig. 5. The reader is requested to compare it with the structure of the NaCl.

The density of iron is given in the following equation:

$$\rho = \frac{\text{mass of atoms in unit cell}}{(A_{100})^3}$$

$$\rho = \frac{2 \times 55.84 \times 1.65 \times 10^{-24}}{(A_{100})^3}$$

$$\rho = 7.87 \text{ (for iron single crystal)}$$

$$[a_0]^3 = \frac{2 \times 55.84 \times 1.65 \times 10^{-24}}{7.87}$$

$$\therefore a_0 = 2.86 \times 10^{-8} \text{ centimeters}$$

(A value in good agreement with x-ray measurements)

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Experimental Verification of Laue's Theory: Laue knew that the wave length of x-rays were of the order of 10^{-8} centimeters and that the lattice constants of some natural crystals were of the same order. In accordance with the laws of optics, the crystal, therefore, is a natural 3-dimensional grating capable of determining the wave length of x-ray radiations. The method of determining the lattice constant of a simple lattice structure like NaCl and pure iron has been demonstrated, and with this determined the wave length of the radiation diffracted by any known crystal face can be measured.

With these facts in mind Laue conjectured that if these ideas were sound and if the atoms situated on lattice sites would assume the role of diffraction centers then a crystal would serve as diffraction gratings for x-ray radiation. He demonstrated his ideas experimentally in collaboration with Friederich and Knipping. They passed a pencil of x-rays defined by a slit system through a small crystal and recorded the effects of diffraction on a photographic plate placed several centimeters beyond the crystal and obtained a diffraction pattern as predicted. Laue diagrams of Fe_3O_4, mica and $CuSo_4$ are shown in Fig. 6 and are similar to those Laue originally obtained. X-ray patterns made of single crystals usually appear spectacular due to the symmetry of the crystals.

Laue's discovery, therefore, merged two great fields of science—the physics of x-rays and crystallography. This has advanced the knowledge of the internal structure of crystals.

A phase of the work that stands out in bold relief is the soundness of the ideas developed by Hauy, Bravais, Schocaflies, and others. How remarkable to find the fundamental work of these early workers to be substantially correct and to require only experimental proof such as furnished by Laue!

(To be continued)

—o—

Condensed information in chart form on such factors as creep strength, short time tensile strength, oxidation and corrosion resistance, temper embrittlement and minimum physical properties on high temperature steels for alloy tubes and pipes is contained in a bulletin published recently by Babcock & Wilcox Co., New York. It serves as a convenient guide showing some of the materials which are available for processing into tubes and pipes for meeting high temperature requirements.

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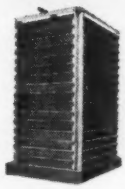
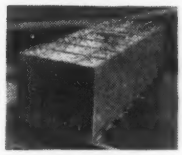
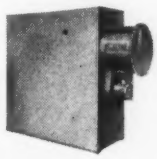


Atmospheric Spray Cooling Towers

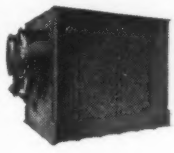
Small sizes, in a variety of standard units with capacities ranging from 10 to 125 GPM—larger units handle from 600 to 1,200 GPM. Special designs furnished in sizes of exceptionally large capacity. Standard tower capacity and temperature performance are based on nozzle pressure of 7 pounds per square inch.

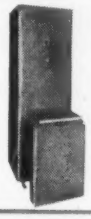




Horizontal Induced-Draft Cooling Towers

The horizontal-draft principle of operation results in a tower having relatively low height. Single-fan units of the spray-filled type have fans from 18 to 30 inches in diameter. Larger twin units have fans from 42 to 48 inches in diameter. Frequently installed in multiples for larger capacities.



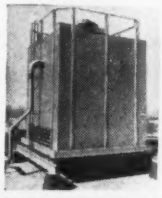


Spray-Filled Forced-Draft Towers

Small, compact, quiet, specially suitable for use with packaged air conditioners. Nineteen sizes for systems ranging from 3 to 21 tons of refrigeration.

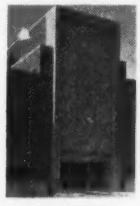
Redwood Atmospheric Cooling Towers

In single-section units of solid redwood construction, are built in seven standard sizes to handle normal capacities of 20 to 125 GPM of cooling water.



Steel-Cased Induced-Draft Cooling Towers

Towers of this type are of the spray-filled or deck-filled type—made in 20 standard sizes of square-foot rated area. Larger models are engineered to specification. Air-propulsion assemblies for either type can be arranged for V-belt or reduction-gear drive, as required.

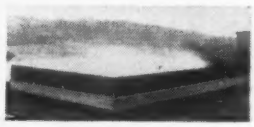


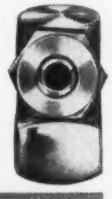
Induced-Draft Masonry Cooling Towers

Engineered for large-scale air-conditioning systems in towers that harmonize with the architectural features of the building. Spray or deck filled.

Binks Spray Pond Equipment

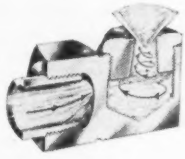
Thousands of Binks-equipped spray ponds prove them the best method for cooling large quantities of water with great operating economy.





Binks Rotojet Nozzles

Non-clogging Rotojet nozzles are the heart of every Binks cooling system. There is a size for every purpose, from 1/8" to 2 1/2" pipe connections. All give fine fluid break up of the precision made from quality brass. Interior surfaces are smooth and free from vanes and other obstructions.



Binks MANUFACTURING COMPANY

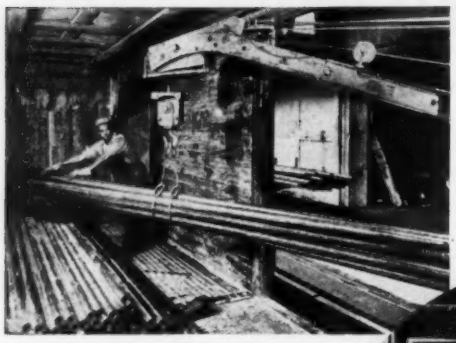
3134-40 Carroll Avenue, Chicago 12, Illinois

NEW YORK DETROIT LOS ANGELES ATLANTA BOSTON CLEVELAND DALLAS MILWAUKEE NASHVILLE PHILADELPHIA PITTSBURGH ST. LOUIS SAN FRANCISCO SEATTLE WINDSOR, ONTARIO, CANADA

Send now for free copy of our new Catalog-Data Book. Request your copy on your company letterhead.

96 MAN HOURS CUT TO 32— WITH BAKER TRUCK

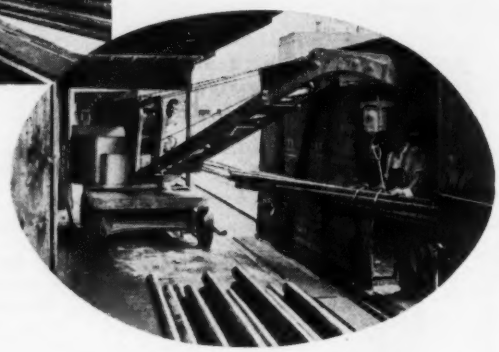
Crane Truck at NATIONAL ACME CO. pays for itself in 8 months



This Baker Crane Truck, unloading 20 ft. steel tubes each weighing 260 lbs., cuts man hours by 2/3 over former methods. Actual savings — as shown in tables below — are even greater than estimates made before the truck was purchased:

(Above) Boom of Baker Crane truck leaving box car with load of ten 2¾" x 20 ft. steel tubes.

(Right) Baker Crane Truck loading tubes onto trailer. Each tube weighs 260 lbs., load weighs 2600 lbs.



Man Hours per car — Previous Methods

96 MAN HOURS

Remove blocking from car	0.5 hrs. x 4 men	2.0
Unload to trailer 100,000 lbs.	11.0 hrs. x 4 men	44.0
Clean car	0.5 hrs. x 4 men	2.0
Haul to storage Unload from trailer to pile Return empty trailer	12.0 hrs. x 4 men	48.0
Total man hours		96.0

Estimated Man Hours with Baker Truck

45 MAN HOURS

Remove blocking from car	1.0 hrs. x 2 men	2.0
Unload to trailer 100,000 lbs.	11.0 hrs. x 2 men	22.0
Clean car	1.0 hrs. x 2 men	2.0
Haul to storage Unload from trailer to pile Return empty trailer	9.5 hrs. x 2 men	19.0
Total man hours		45.0

Actual Man Hours with Baker Truck

32 MAN HOURS

Remove blocking from car	0.5 hrs. x 2 men	1.0
Unload to trailer 100,000 lbs.	7.0 hrs. x 2 men	14.0
Clean car	0.5 hrs. x 2 men	1.0
Haul to storage Unload from trailer to pile Return empty trailer	8.0 hrs. x 2 men	16.0
Total man hours		32.0

A Baker Material Handling Engineer can show you how to make similar savings

BAKER INDUSTRIAL TRUCK DIVISION
of The Baker-Raulang Co.
2167 WEST 25TH ST. CLEVELAND, OHIO
In Canada: Railway & Power Engineering Corporation, Ltd.

Baker INDUSTRIAL TRUCKS

Metal Stampings

(*Concluded from Page* 120)

several stampings formed from alloy strip steel, brought together into a single component, heat treated and subsequently machined to its finished state.

Hydrogen brazing method as well as various other accepted welding processes offer the possibility of combining stampings with metal tubing, screw machine parts and rolled shapes. The possibility of these combinations is unlimited.

Stamping companies are specialists, Mr. Wolf stated in conclusion, and advised that in order to get in touch with the right manufacturers with the least possible confusion, the armed forces should channel their requests through Pressed Metal Institute, Cleveland. It has offered its facilities as a clearing house for the benefit of the services.

New Gage Determines Chisel Bushing Wear

By developing a new tool to perform a service and by making this tool available at less than its cost of manufacture, Bedford Tool & Forge Co., Bedford, O., manufacturer of hand and pneumatic chisels, is reaping a harvest of goodwill.

Development of the instrument, a "go" and "no go" gage, was prompted by complaints over shank breakage of pneumatic hammer chisels, caused by worn bushings rather than by chisel defects.

What was needed was a gage to determine quickly when to change bushings in pneumatic chipping hammers; past method of determining this was either by use of inside micrometers, which was too slow and costly, or by the "feel" of the chisel shank in the bushing, which was subject to the personal element.

The gage which Bedford developed was offered to chisel users for less than its actual cost in the belief users would save on new tool costs by the prevention of shank breakage caused by worn bushings, and the response to the offer has been adequate proof to the company that services of this kind performed for the benefit of industry bring unexpected rewards in goodwill and company recognition.

—o—

To be shown in operation for the first time at the Third National Instrument Conference and Exhibit in Philadelphia, Sept. 13-17, will be pH, conductivity and smoke density recorders developed by Bailey Meter Co., Cleveland. The pH and conductivity recorders are combined in one instrument.

CHECK THIS LIST FOR RELIABLE NEW SOURCES

✓ ABRASIVE WHEELS
✓ CRUCIBLES and REFRACTORIES
✓ CEMENTS-ALLOYS

Electro PRODUCTS AND SERVICES SATISFY THE SPECIAL REQUIREMENTS OF EXACTING INDUSTRIES!

Our understanding of the special requirements of exacting industries is intimate and detailed. That we should apply our engineering, metallurgical and chemical research and inventiveness to the advantage of these industries, is natural. But, while we are pardonably proud of our products for the metal working and ceramic industries especially, we attach even more importance to the job-side cooperation of our field engineers.

The products with which we serve industries (See Right-hand Column) suggest the special values to you of Electro Products and Services. As an approach to possible application of them to your objectives, we invite without obligation to you, a confidential statement of your problems.

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Non-Ferrous and Ferrous Foundries; Steel Mills and Smelters; Brass Rolling Mills; Heat Treaters and Annealers; Potteries; Art Potteries; Grinding Wheel; Sanitary Ware; Floor and Wall Tile; Electrical Porcelain; and miscellaneous Ceramic Plants.

THE AUTOMOTIVE, CHEMICAL, SHIPBUILDING
and Utilities Industries as well as Federal, State and Municipal Agencies.

with

1 ABRASIVE WHEELS

Abrasive Wheels—Resin-bonded, High-Speed Grinding Wheels to cover nearly every conceivable use from snagging and cutting operations to fine precision grinding.

2 CRUCIBLES

Crucibles, (Tercod-Conqueror) Pedestal Blocks and Pot Lids—The Carbon-bonded Crucible for melting aluminum—nickel—copper—the brasses and bronzes—zinc—silver—gold—iron, using any fuel: oil, gas, coke or coal, electricity.

3 REFRACTORIES

Special Refractories—Electric furnace refractories of all kinds used for:

Ceramic Kiln Furniture—Slabs and Posts for rigid, floating or semi-floating open construction; plate setters, tile setters, sanitary ware setters and silicon carbide saggers.

Muffles and Hearths—One piece and sectional for enameling furnaces, tunnel kilns, assay and heat treating furnaces, pottery kilns.

Crucible Furniture—Linings, covers.

Pyrometer Tubes—And tubes for other purposes.

Brick—9" series or special shapes to individual specifications.

Burner Blocks—And for electric furnace door blocks, door frames, port blocks and electrode sleeves.

Stopper Heads—For steel ladles; also slag hole and tap hole blocks for Cupolas.

4 CEMENTS

Cements and Ramming Compositions—Of special refractories used by all industries; monolithic linings for electric, gas and oil furnaces; patching furnace walls, laying brick, boiler setting and ladle linings.

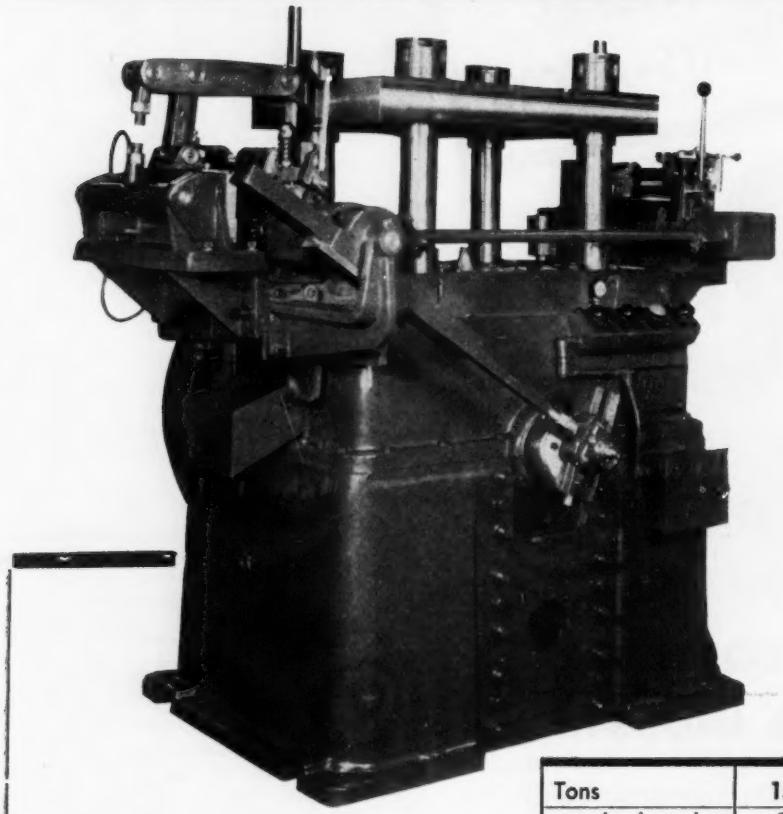
5 ALLOYS

ALLOYS—Special compositions for additions, deoxidation, degasification, purification: Copper—Aluminum—Chromium—Titanium—Nickel—Silicon—Magnesium—Iron—Lithium—Calcium—Calcium Boride—Tin—Zinc—Lead.

Electro Refractories & Alloys Corporation
344 DELAWARE AVE. BUFFALO 2, N. Y.

Blanking, forming and deep drawing at high speed with a

BRANDES PRESS



This press has been designed and built simply to make money for you by producing stampings at high speed. The machine is precision built and features rigid construction and low stress loads, properties which assure long continuous uninterrupted production at a minimum cost. Patented precision guiding features permit the use of long progressive dies, which feature plus low center of gravity result in higher than normal production speeds and greatly increased die life. The *BRANDES PRESS* has air counterbalance, air operated friction clutch and brake electrically controlled, continuous automatic lubrication as standard equipment, and requires no special foundation. The BRANDES PRESS is available in sizes from 30 to 750 tons capacity, and has a wide application in the stamping field. Illustration is that of a 150 ton capacity press. Let one of our engineers look over your stamping problems; he is qualified to show you how to lower costs and increase production. There is no obligation, of course. There is good news on delivery too; our production schedule enables us to make early shipment.

Tons	150
standard stroke	3"
adjustment	3
crankshaft dia.	6½"x8½"
pitman screw dia.	5½"
draw rods dia.	4¾"
die clearance	20"x25"
bed area	38"x60"
bed opening	10"x40"
top platen area	36"x54"
flywheel dia.	60"x12"
flywheel rim weight	4000#
height over all	105"
to top of bed	71"
h.p. motor	25
floor space	8'x8'
weight	39,000#
strokes per min.	150
hole in upper slide for punch-shank	3"

The Brandes Press Co., 6408 Euclid Ave., Cleveland 3, O.

Aluminum Alloy Castings

(*Concluded from Page 94*)

tion is needed. It is only necessary to be sure that the surface is clean. Often a thorough cleaning with a solvent is sufficient. When paint is required for protection, however, greater precautions must be observed in the preparation of the surface.

One of the most effective of the simple chemical treatments employs a dilute aqueous solution of phosphoric acid. Inhibited alkaline cleaners also are used, but they are usually followed by a dilute acid treatment (chromic or phosphoric). For severe exposure conditions, the chemical and anodic-oxide treatments, as described in previous sections of this article, provide excellent bases for paint. After cleaning or other surface preparation, the metal must be thoroughly dried before paint is applied. Casting are dried by heating.

Selection of the paper primer is one of the most important single steps in painting aluminum. Of the various suitable commercial primer pigments, zinc chromate has been found to have the highest corrosion-inhibitive properties. For less severe exposure, any of a wide variety of commercial primers may be used, including aluminum paint. Once the surface has been primed, almost any durable exterior paint, enamel, or lacquer may be applied. Any of the standard methods of application may be used.

Films Made of Standard Register's Control System

Two sound-slide films depicting a case history of record control in action have been prepared for presentation in a 35-minute clinic by Standard Register Co., Dayton 1, O. The films demonstrate the company's system which provides a control of men, material and machines through control of every original record written. They point out how a user of the system found its scrap rejects reduced 23 per cent.

Shown are the weaknesses common to many inspection report systems: Repeated inspection and reporting of the same lots of work, double payment of labor on the same lots; shortage of material at assembly, etc.

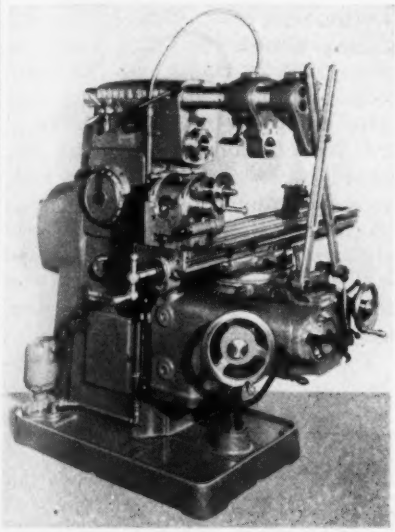
—o—

Booklet containing reprints of three papers on important aspects of health control in industrial lead workers now may be purchased from the Lead Industries Association, New York.

New Products and Equipment

Milling Machine

An increased vertical capacity, a No. 50 milling machine standard taper hole in spindle, suitable spindle speeds for larger cutters and ample rigidity for using greater power are features of the new No. 2 plain and universal (illustrated) milling machines made by Brown & Sharpe Mfg. Co., Providence, R. I. Full 5-horsepower, all gear drive is provided to cutters. Cutting feed and fast travel are independently all gear driven by a 3/4-horsepower motor synchronized with



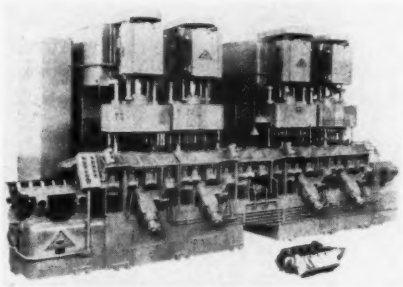
spindle motor. A single lever selects any of the 18 spindle speeds and another any of the 18 cutting speeds.

Coolant system is operated by a 1/4-horsepower motor driven centrifugal pump which automatically stops when the spindle stops. Automatic lubrication is provided for column, knee, table, saddle and slides. The spindle nose extends forward more than 3 inches from the conventional position, reducing overarm and arbor lengths and giving greater rigidity. Both machines have a longitudinal feed of 28 inches, transverse feed of 10 inches and a vertical feed of 16-1/2 inches.

Check No. 1 on Reply Card for more Details

Line Process Machine

Approximately 72 pieces is the hourly production of th seven-station line process machine in drilling, reaming, chamfering and counterboring bottom face of a "V-8" cylinder block. Manufactured by LeMaire Tool & Mfg. Co., 2657 South Telegraph Road, Dearborn, Mich., the automatic machine consists of two main center base sections of rigid welded construction to support two columns, work holding fixtures and index mechanism. Each column supports two LeMaire No. 5000 twin ram self-contained hydraulic drill units with multiple-spindle drill heads, which

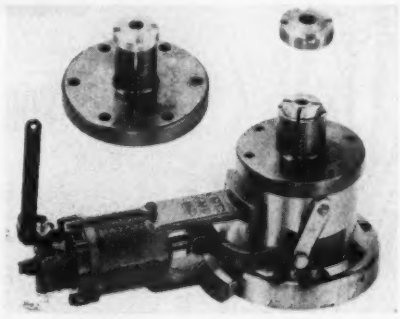


move on hardened and ground guide bars that keep heads in alignment with fixtures. Transfer of cylinder blocks is by means of a transfer bar with latch type fingers that retract on the bar's return stroke. Location for the first operating station is by a wedge type locator entering cored opening in side of block.

Check No. 2 on Reply Card for more Details

Internal Collet

Use with any collet chucks or standard collet attachments is claimed for the new internal expanding collets, flanged devices with a protruding section that extends beyond the flange and is split in four ways, made



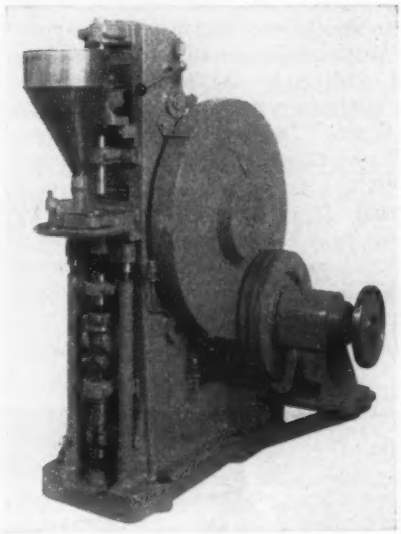
by Zagar Tool Inc., 23880 Lakeland Blvd., Cleveland 17, O. It is made of spring tempered tool steel. A cone-shaped wedge through the center expands the four sections to hold the part internally.

Action to pull the wedge is obtained by the collet chuck mechanism which is common to all standard tools made by the company. The internal collet is fastened with screws and is held concentric by a round seat or pocket. A feature of this collet is that it does not move in a longitudinal manner so that overall dimensions on parts to be machined can easily be held.

Check No. 3 on Reply Card for more Details

Powdered Metal Press

High speed production of powdered metal parts such as porous bearings, alnico, cemented carbides, iron cores, blind end bearings, etc., is possible with the new 12-ton capacity press announced by F. J. Stokes Machine Co., 5900 Tabor Rd., Philadelphia 20, Pa. Identified as the G-4 press, it is built of Meehanite and is capable of



applying pressures up to 12 tons simultaneously from both top and bottom.

Built into the machine is a movable core rod which can be arranged to drop before the die is filled and then automatically push up from below to assure uniform distribution and a full die cavity before pressure is applied. The press can be operated with a compound or secondary lower punch, adjustable stroke or pressure, by a simple cam change. Maximum die fill is 4 inches and maximum diameter of piece that can be produced is 2¼ inches.

Check No. 4 on Reply Card for more Details

Face Plate, Attachments

With the multipurpose face plate and attachments made by Superior Mfg. Co., 1302 Ontario St., Cleveland 13, O., a lathe can quickly and easily be converted into a milling or boring machine or a drill press. Regular or odd shapes and sizes can be handled. The average machine operator can make the changes re-

quired for different types of work.

Bar stock or castings can be drilled, bored, milled or ground. Operations at any radial or angular relation to each other can be performed without moving the work from its original position in a fixture. In addition to the face plate and adapter, the attachments consist of a vertical V-block, an auxiliary T-slot plate and a horizontal V-block with face plate, a 3-jaw chuck, an angle plate and a horizontal V-block with clamp.

Check No. 5 on Reply Card for more Details

Soluble Oil Mixer

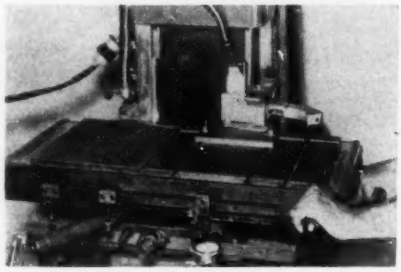
Water and oil are proportioned, mixed into a uniform emulsion and transferred from the original drum into another container ready to pour into the machine sump or circulating system by the soluble oil mixer developed by Stewart-Warner Corp.'s Alemite Division, 1826 Diversey Pkwy., Chicago 14, Ill. The mixing unit is inserted in the bunghole of a drum of soluble oil, connected by hose to a water outlet and adjusted. Water pressure averaging 24 to 30 pounds per square inch is the only power required.

Compact unit weighs 5½ pounds. The model 6780 mixer is supplied with a 2-inch pipe thread sliding bung adapter for various heights of drums. It has a 3/8-inch female pipe thread union inlet for water hose and a ½-inch male pipe thread connection for outlet hose.

Check No. 6 on Reply Card for more Details

Grinder Table

Greater precision and a smoother approach for feeding work into the grit belt are features of the improved automatic feed table for the model BG8 wet abrasive belt grinder built



by Porter-Cable Machine Co., Syracuse 8, N. Y. Any material may be ground and polished to a close tolerance with the model FT-9 table.

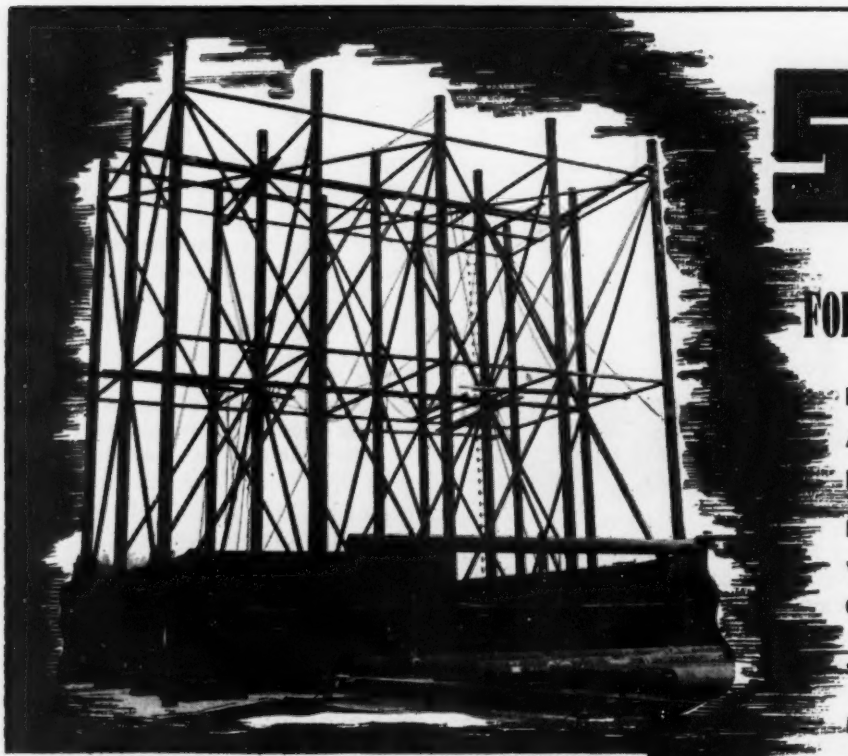
Table has separate system for recirculating the coolant and for driving the feed table. Special coolants may be used for various materials, while the table is independently operated by a standard hydraulic oil. A rod has been added to the formerly free piston, with a gland at the end of cylinder oil shield, to assure smooth action at all times. The table automatically controls the pressure and rate of feed while a dial indicator shows rate of machining. A micrometer stop halts the operation and can be reset instantly. Fixtures are held by T-slots.

Check No. 7 on Reply Card for more Details

Tensile Testing Machine

Wire, rope, cable, chain, belting and similar flexible tensional materials of any desired length may be tested on the horizontal tensile testing machine developed by Baldwin Locomotive Works, Philadelphia 42, Pa. Designed to test long specimens with high elongations at loads up to 120,000 pounds, the machine takes specimens from ¼ to 4 inches in diameter with a maximum stretched length of 25 feet under full test load. Minimum length of specimens is 2 feet.

Unlimited stroke up to 25 feet is



STEEL

FOR THE OIL BUSINESS

Link three names together—Steel, AVONDALE, and Oil . . . and you have forged a chain of industrial progress. Steel is the material from which AVONDALE makes tools for the Oil Industry.

Pipe jackets for constructing Oil Well Drilling platforms in the Marine Fields off Louisiana. Designed by J. Ray McDermott & Co., Inc.

STEEL

AVONDALE MARINE WAYS, INC.

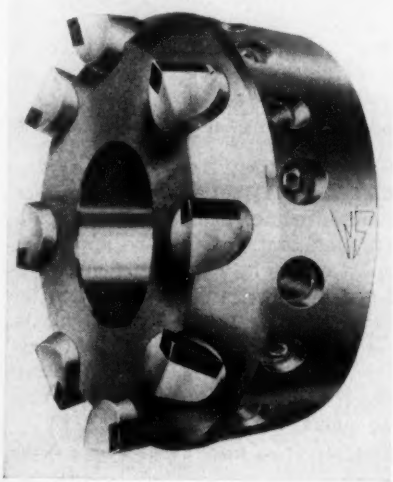
RIVER FRONT, NEW ORLEANS DISTRICT — MAIN PLANT, AVONDALE, LA.
TELEPHONES: WALNUT 4070 - CHESTNUT 5883 — QUICK REPAIR PLANT — HARVEY, LA.
MAILING ADDRESS: WESTWEGO, LOUISIANA

accomplished by a two-screw carriage drive. Screws on each side of the machine's main frame are driven through speed reduction gears by a 10 horsepower electronically controlled, variable speed, direct current motor. Driving speeds of 3/8 to 18 inches per minute are maintained accurately in either direction by electronic control. Four sets of 36-inch grips hold different sizes of rope and are fitted into wedge type chucks.

Check No. 8 on Reply Card for more Details

Milling Cutters

Wendt-Sonis Co., Hannibal, Mo., is producing inserted tooth cutters embodying right hand cutting blades as standard. The same cutter body can be used as a left hand cutter by inserting a set of left hand style blades. Blade holding fixture of the cutters



is designed for quick and accurate blade setting.

Blades are held securely in position. Precision built rigid cutter bodies have added weight to insure maximum power in the cut. Each style cutter has the type of mounting best suited for safety in operation and accuracy in machining. The 6-inch cutter has a "C" mounting and the 8-inch cutter a direct mounting.

Check No. 9 on Reply Card for more Details

Electrostatic Voltmeter

A portable electrostatic voltmeter designed to meet the need for a high-impedance, high-voltage instrument in laboratory and industrial testing is available in ratings of 40, 50, 60, 70 and 75 kilovolts rms from General Electric Co., Schenectady 5, N. Y. It can be used to measure applied voltage during dielectric test, to study phenomena, to determine peak voltage by the vacuum tube method, to

Increase TOOLROOM EFFICIENCY WITH Quick Acting JOHNSON FURNACES

Heat treat high speed steels, dies and tools in your own plant at LOW COST

A larger Johnson Unit for quick, accurate heat-treating high speed steels, dies and cutting tools. Reaches operating temperatures FAST to save time and gas. Firebox 7¾x13x16½ lined with high temperature refractory. Features counterbalanced door opening upwards. Four burner unit is recommended for both carbon and high speed steels. Six burner unit is used exclusively for high temperatures. Complete with Carbofrax hearth, G. E. Motor and Johnson Blower.

JOHNSON HI-SPEED No. 130A
4-Burner for 1400—2350° F . . . $295.00
6-Burner for 1800—2400° F . . . 325.00
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Compact, powerful and remarkably economical in operation, Johnson Hi-Speed No. 120 is unexcelled for heat treating high speed steels . . . for hardening ANY steel dies, tools or small metal parts. Gets the job done quickly to save time and gas. Two powerful burners fire under hearth to produce high uniform heat. Temperatures easily regulated with accuracy. Firebox 5x7¾x13½ lined with high temperature insulating refractory. Ready for action with Carbofrax hearth, G. E. motor and Johnson Blower.

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Reaches 1500°F in 5 Minutes
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measure exceptionally high voltage when used with a voltage divider and to determine the peak voltage output of magnetos.

The 50-pound unit is housed in a cylindrical steel case 21-1/2 inches in diameter. Its high voltage connector projects about 12 inches above the top of the 35-inch case. The moving system consists of two fixed electrodes between two small metal spheres that revolve on a pivoted shaft on which are mounted aluminum damping vanes, a mirror and a spring. The mirror reflects a beam of light onto the scale, indicating the position of the moving electrode.

Check No. 10 on Reply Card for more Details

Industrial Counter

Ohmer Corp., Box 998, Dayton, O., is producing its type 82-A single control register, a double counter with two sets of recording figures. The upper set of figures, which are 7/8-inch high, record a count of up to 999. This total may be returned to

zero at any time. The lower set of figures, which are 9/16-inch high, record a grand total up to 99,999 and then automatically return to zero.

The grand total register is operated by a lever at the right which may be moved by hand or actuated by any mechanism with a reciprocating motion. The counter can be fitted with a bell to ring at each operation.

Check No. 11 on Reply Card for more Details

• • •

SLUDGE SOLVENT: Swan - Finch Oil Corp., New York 20, N. Y., has developed a sludge and gum solvent for addition to regular hydraulic oils. After 100 to 150 working hours allowed for the treatment, the system is to be drained and new oil put in. Hydro-Solv "A" is a liquid concentrate of several highly active organic gum and sludge solvents.

Check No. 12 on Reply Card for more Details

TEST PLUGS: A line of Hydro-Matic self-sealing test plugs and pressure line filling connectors with expanding head pull rods are being produced by Mechanical Products Corp., Chicago 7, Ill. They will seal plain or threaded holes in flanged or fitted opening of almost any depth in tanks, boilers, etc. Testing pressure from within the tank is utilized to actuate a piston with sufficient force regardless of testing pressure.

Check No. 13 on Reply Card for more Details

OIL ATOMIZER: A mechanical fuel oil atomizer with a wide range, made by Engineer Co., New York 6, N. Y., eliminated the need of changing sprayer plates. It has a capacity range of 10 to 1 without returning or recirculating oil which is delivered to the unit at 300 pounds per square inch. Output is variable by manual or automatic adjustment of a hand wheel.

Check No. 14 on Reply Card for more Details

HOT-SPRAY PAINTING: Using heat to create optimum spray painting condition, a new hot spray painting process, developed by the Bede Products Inc., Cleveland 11, O., reduces paint viscosity and lowers amount of thinner required. Paint is heated to any desired temperature (generally 200°F) through use of a paint heater. Two models are offered: One heats paint only and the other both paint and air.

Check No. 15 on Reply Card for more Details

PRESS CONVERTER: Conversion of any of the popular size hand operated arbor presses into air presses may be carried out by the air conversion unit designed by Paragon Metal Products, Chicago 7, Ill. Conversion is by removing ram retainer plate and ram, place air unit into ram seat, replace plate and connect to air line. Stroke is 2½ inches and power factor 12-1/2 times line pressure.

Check No. 16 on Reply Card for more Details

TAILSTOCK: Operation of loading the work is reduced to one motion with the Fast-Lock tailstock for gear shaving machines, built by National Broach & Machine Co., Detroit, Mich. A screw advance and locking mechanism allows operator to lock work by pushing handle away. As soon as center is seated in arbor or part, locking is positive.

Check No. 17 on Reply Card for more Details

AIR CONTROL VALVE: Balance piston of the 3 and 4-way master air control valve for air cylinders, made by Valley Tool Co., Los Angeles 22, Calif., does not require a lapped fit. It is used to actuate the molded oil resistant slide valve back and forth. It will accommodate various applications by adding accessories.

Check No. 18 on Reply Card for more Details

CIRCUIT BREAKER: Features of the Multi-Breaker service and load center, made by Square D Co., Detroit 11, Mich., include Ad-On unit which permit circuits to be added or changed to satisfy new requirements and high speed, thermal-magnetic tripping. The type MB4 consists of a double polarity, 4-pole basic unit with provision to add four more single pole units. Single poles are calibrated 15, 20 and 30 amperes.

Check No. 19 on Reply Card for more Details

FUME COLLECTOR: The cone shaped hood of the welding fume collector, developed by Ruemelin Mfg. Co., Milwaukee 12, Ill., has large oval openings measuring 9 x 11 inches to provide fume removal from a greatly increased working area. Now standard equipment, the hood is available as a replacement on all existing fume collectors.

Check No. 20 on Reply Card for more Details

METAL PRIMER: Vinsynite primer, a metal primer made by Thompson & Co., Oakmont, Pa., can be applied on damp or slightly oily surfaces without degreasing and still cling to the metal. Containing no toxic pigments, the primer is air drying, being applied with spray or brush. It is a corrosion inhibitor and serves as a base for paint, etc.

Check No. 21 on Reply Card for more Details

MARKING MACHINE: Automark automatic marking machine, announced by Cadillac Stamp Co., Detroit 7, Mich., will mark effectively on steel, iron, brass, aluminum, Bakelite, plastics, etc. and is suited to light forming and piercing operations. Assembly work such as pressing, staking, crimping and light riveting can be performed. An electric control releases stamping ram only when work is in position. Special work feeding devices can be installed to make the machine fully automatic.

Check No. 22 on Reply Card for more Details

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Market Summary

STEEL QUOTAS— High degree of uncertainty prevails with respect to effect of voluntary allocations on steel distribution over the remainder of the year. Nevertheless, the situation is clearing to some extent, and indications point to establishment of consumer quotas for the entire fourth quarter, at least on a tentative basis, within the next week or so.

Certain large mills which have been declining to go beyond October in allotting tonnage to the general trade now indicate they may be able to set up quotas for the entire fourth quarter by the end of this week. However, allotments will be smaller than in the current period, and consumers will have to scratch vigorously for tonnage to support operations.

PRODUCT POSITION— Exact supply position of the major products is difficult to assess with any degree of accuracy. Conditions vary considerably among the mills. In every case, however, demand is far in excess of mills' ability to produce so that the difference is solely one of degree. In this connection, steel producers point out some of the consumers' supply difficulties are attributable to the shortage of freight cars. For example, lack of gondolas currently is restricting the movement of steel pipe.

In general, producers of carbon steel bars are making better progress on fourth quarter allotments than are sellers of other major items. Carbon bar quotas will be off from the third quarter, but not too sharply. However, cold-drawn bar producers' order books are filled to the end of the year, and in a few cases tonnages have been accepted for delivery into 1949. Also, alloy bar deliveries are being further extended.

SHEET STEEL— Few producers of flat-rolled products find themselves in position to establish quotas for the entire fourth quarter. As a matter of fact, the worst fears of sheet buyers with regard to fourth quarter supplies are being realized. It is clear new tonnage will be substantially less than in the current quarter due to special allotments.

Indications are the stringency in sheet and strip will be even more pronounced in first quarter next year when shipments under the European recovery program are stepped up.

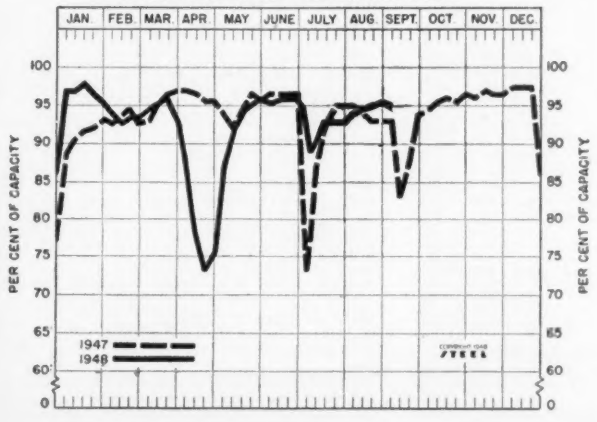
RAW MATERIALS— Continued shortage of raw materials, especially pig iron and scrap, is hampering steelmaking and foundry operations. The tight supply situation in pig iron shows no signs of early easing. Some foreign iron is being imported at high prices but the tonnage is too small to exert much influence on the overall situation. Production of pig iron in the first seven months of this year totaled 33,861,473 tons, a decline compared with 34,070,417 tons in the like period last year.

With respect to scrap, tonnage continues limited but the market appears under less pressure. German scrap is beginning to flow toward this country and the tonnage will increase.

PRICES— Talk is heard of likely steel price increases in event production costs continue to mount. That there is some substance to this talk is seen in the fact some upward price adjustments directly tied to the fluctuations in production costs were effected over the past week or so. For example, galvanized pipe was raised $3 to $5 per ton, reflecting recent increases in the price of zinc. Last week, one leading producer belatedly announced upward adjustments in stainless steel prices in line with those of other interests. Also, a maker of electrical sheets reduced its list prices to a basis competitive with other sellers.

COMPOSITES— Due to retroactive price increases by various steelmakers, STEEL's finished steel price composite last week was revised to $93.86 for each week since that ended July 26. The current composite compares with $75.41 for the closing week of August, 1947. Other composites are unchanged from a week ago with semifinished steel, $75.75; steelmaking pig iron, $44.19; steelmaking scrap, $43.33.

STEELWORKS OPERATIONS



DISTRICT STEEL RATES

Percentage of Ingot Capacity engaged in Leading Districts

	Week Ended Sept. 4	Change	Same Week 1947	Same Week 1946
Pittsburgh	94.5	— 1	98.5	98
Chicago	94	— 1	90.5	74.5
Eastern Pa.	92	None	92	80
Youngstown	103	None	92	89
Wheeling	92.5	— 0.5	81.5	81.5
Cleveland	91.5	— 6	91	88
Buffalo	101.5	None	94	90.5
Birmingham	100	None	99	99
New England	80	None	80	84
Cincinnati	99	— 7	87	83
St. Louis	85	None	82	44.5
Detroit	99	None	92	91
Estimated national rate	95	— 1	93	85.5

Based on weekly steelmaking capacity of 1,802,476 net tons for 1948; 1,749,928 tons for 1947; 1,762,381 tons for 1946.

COMPOSITE MARKET AVERAGES

Arithmetical Price Composites*

	Sept. 4	Aug. 28	Month Ago Aug. 1947	Year Ago Sept. 1947	5 Years Ago Sept. 1943
Finished Steel	$93.86	$93.86	$93.86	$75.41	$56.73
Semifinished Steel	75.75	75.75	75.75	56.80	36.00
Steelmaking Pig Iron	44.19	44.19	44.13	36.14	23.00
Steelmaking Scrap	43.33	43.33	43.33	37.83	19.17

FINISHED STEEL WEIGHTED COMPOSITE†

Aug. 1948	4.06642¢
July 1948	3.79216¢
Aug. 1947	3.46652¢
Aug. 1943	2.45773¢

***STRAIGHT ARITHMETICAL COMPOSITES:** Computed from average industry-wide mill prices on Finished Carbon Steel (hot-rolled sheets, cold-rolled strip, hot-rolled bars, plates, structural shapes, basic wire, standard nails, tin plate, standard and line pipe), on Semifinished Carbon Steel (re-rolling billets and slabs, sheet bars, skelp, and wire rods), on Basic Pig Iron (at eight leading producing points), and on Steelworks Scrap (No. 1 melting grade at Pittsburgh, Chicago and eastern Pennsylvania). Steel arithmetical composites, dollars per net ton; pig iron and scrap, gross ton.

†**FINISHED STEEL WEIGHTED COMPOSITE:** Computed in cents per pound, mill prices, weighted by actual monthly shipments of following products, representing about 82 per cent of steel shipments in the latest month for which statistics are available, as reported by American Iron & Steel Institute: Structural shapes; plates, standard rails; hot and cold-finished carbon bars; black butt weld pipe and tubes; black lap weld pipe and tubes; black electric weld pipe and tubes; black seamless pipe and tubes; drawn wire; nails and staples; tin and terne plate; hot-rolled sheets; cold-rolled sheets; galvanized sheets; hot-rolled strip; and cold-rolled strip. July and August, 1948, figures are preliminary.

COMPARISON OF PRICES

Representative market figures for current week; average for last month, wire rods, cents per lb; semifinished (except wire rods) and coke, dollars three months and one year ago. Finished material (except tin plate) and per net ton, others dollars per gross ton. Delivered prices represent lowest from mills.

Finished Materials

	Sept. 4 1948	Aug. 1948	June 1948	Sept. 1947
Steel bars, Pittsburgh mills	3.45c	3.45c	2.875c	2.90c
Steel bars, del. Philadelphia	3.79	3.79	3.365	3.28
Steel bars, Chicago mills	3.35	3.35	2.875	2.90
Shapes, Pittsburgh mills	3.25	3.275	2.775	2.80
Shapes, Chicago mills	3.25	3.25	2.775	2.80
Shapes, del. Philadelphia	3.48	3.48	2.98	2.94
Plates, Pittsburgh mills	3.50	3.50	2.925	2.95
Plates, Chicago mills	3.40	3.40	2.925	2.95
Plates, del. Philadelphia	3.71	3.71	3.21	3.15
Sheets, hot-rolled, Pittsburgh mills	3.275	3.275	2.775	2.80
Sheets, cold-rolled, Pittsburgh	4.00	4.00	3.50	3.55
Sheets, No. 10 galv., Pittsburgh	4.40	4.40	3.90	3.90
Sheets, hot-rolled, Gary mills	3.25	3.25	2.775	2.80
Sheets, cold-rolled, Gary mills	4.00	4.00	3.50	3.55
Sheets, No. 10 galv., Gary mills	4.40	4.40	3.90	3.90
Strip, hot-rolled, Pittsburgh mills	3.275	3.275	3.05	2.80
Strip, cold-rolled, Pittsburgh mills	4.00	4.25	3.775	3.55
Bright basic, wire, Pittsburgh	4.15	4.325	3.725	3.675
Wire nails, Pittsburgh mills	5.20	5.775	5.125	4.25
Tin plate, per base box, Pitts. dist.	$6.70	$6.80	$6.70	$5.75

Semifinished

Sheet bars, mill	$67.00*	$67.00*	$60.00	$53.57
Slabs, Pittsburgh, Chicago	52.00	52.00	45.00	40.18
Rerolling billets, Pittsburgh	52.00	52.00	45.00	40.18
Wire rod 7/32 to ¼-inch, Pitts. dist.	3.775c	3.775c	3.175c	2.925c

* Nominal.

Pig Iron

	Sept. 4 1948	Aug. 1948	June 1948	Sept. 1947
Bessemer, del. Pittsburgh (N.&S. sides)	$48.08	$48.08	$44.08	$37.83
Basic, Valley	43.00	43.00	39.00	36.00
Basic, eastern del. Philadelphia	46.17	46.17	42.17	38.72
No. 2 fdry., del. Pgh. (N.&S. sides)	47.58	47.58	43.58	37.33
No. 2 fdry., del. Philadelphia	46.67	46.67	42.67	39.22
No. 2 foundry, Chicago	43.25	43.25	39.00	36.00
No. 2 foundry, Valley	43.50	43.50	39.50	36.50
Southern No. 2 Birmingham	43.38	43.38	39.38	34.88
Southern No. 2 del. Cincinnati	49.09	49.09	45.09	39.75
Malleable, Valley	43.50	43.50	39.50	36.50
Malleable, Chicago	43.50	43.50	39.50	36.50
Charcoal, low phos., fob Lyles, Tenn.	62.00	62.00	58.00	44.00
Ferromanganese, fob cars, Pittsburgh	148.00*	148.00*	151.15	140.25

* F.o.b. Aetna, Pa.

Scrap

Heavy melt. steel, No. 1, Pittsburgh	$42.75	$42.75	$40.25	$38.00
Heavy melt. steel, No. 2, E. Pa.	41.50	41.50	39.00	36.75
Heavy melt. steel, No. 1 Chicago	41.75	41.75	39.25	38.75
Heavy melt. steel, No. 1 Valley	42.75	42.75	40.25	39.50
Heavy melt. steel, No. 1, Cleveland	42.25	42.25	39.75	38.25
Heavy melt. steel, No. 1 Buffalo	47.50	46.56	43.00	39.00
Rails for rerolling, Chicago	64.25	64.13	53.75	46.25
No. 1 cast, Chicago	70.00	70.75	68.38	43.50

Coke

Connellsville, beehive furnace	$14.50	$14.38	$13.00	$12.00
Connellsville, beehive foundry	17.00	17.00	15.22	14.50
Chicago, oven foundry, ovens	20.40	20.40	19.50	17.50

FINISHED AND SEMIFINISHED IRON, STEEL PRODUCTS

Finished steel quoted in cents per pound and semifinished in dollars per net ton, except as otherwise noted. Prices apply on an individual producer basis to products within the range of sizes, grades, finishes and specifications produced at its plants

Semifinished Steel

Carbon Steel Ingots: Rerolling quality, standard analysis, open market, $100-105 per gross ton. Forging quality $50 per net ton, mill. **Alloy Steel Ingots:** $51 per net ton, mill. **Rerolling Billets, Blooms, Slabs:** $52 per net ton, mill, except $62, Conshohocken, Pa., mill; sales by smaller interests on negotiated basis at $85 per gross ton, or higher.

Forging Quality Billets, Blooms, Slabs: $61 per net ton, mill, except: $68, Conshohocken, Pa., mill.

Alloy Billets, Slabs, Blooms: Rerolling quality, $63 per net ton, mill.

Sheet Bars: $67 nom., per net ton, mill; sales in open market $110-$115 per gross ton.

Skelp: 3.25c per lb, mill.

Tube Rounds: $76 per net ton, mill; some sellers quoting up to $120 per gross ton.

Wire Rods: Basic and acid open-hearth, 7/32 & ⅜-inch, inclusive, 3.40c per lb, mill, except: 3.65c, Struthers, O.; 3.70c, Worcester, Mass.; 4.05c, Pittsburg, Calif.; 4.10c, Portsmouth, O., Los Angeles; 4.15c, Monessen, Pa. Basic open-hearth and bessemer, not resulphurized, 7/32 to 47/64-inch, inclusive, 3.50c, mill.

Bars

Hot-Rolled Carbon Bars (O.H. only) and Bar-Size Shapes under 3-in. (Base 20 tons one size): 3.35c, mill, except: 3.55c, Ecorse, Mich., Pittsburgh, Monessen, Aliquippa, Pa., 4.05c, Pittsburg, Torrance, Calif.; 4.10c, Atlanta, Ga., S. San Francisco, Los Angeles, Niles, Calif., Seattle, Wash., Portland, Oreg.; 5.30c, Fontana, Calif.

Rail Steel Bars: (Base 10 tons): 3.35c, Moline, Ill., 4.80c, Williamsport, Avis, Pa.

Hot-Rolled Alloy Bars: 3.75c, mill, except: 4.05c, Ecorse, Mich.; 4.80c, Los Angeles; 5.50c, Fontana, Calif.

Hot-Rolled Alloy Bar Shapes: 4.00c, mill.

Cold-Finished Carbon Bars (Base 20,000-39,999 lb): 4.00c, mill, except: 3.95c, Pittsburgh, Cumberland, Md.; 4.00c, Harvey, Ill., Buffalo; 4.10c, Youngstown; 4.20c, Indianapolis; 4.25c, Monessen, Pa.; 4.30c, Ecorse, Mich.; 4.35c, St. Louis; 4.36c, Plymouth, Mich.; 4.40c, Newark, N. J., Hartford, Putnam, Conn., Mansfield, Mass.; 4.45c, Camden, N. J.; 5.30c, Los Angeles.

Cold-Finished Alloy Bars: 4.65c, mill, except: 4.75c, Monessen, Pa.; 4.95c, Worcester, Mansfield, Mass., Hartford, Conn., mills.

High-Strength, Low-Alloy Bars: 5.10c, mill, except: 5.40c, Ecorse, Mich.

Reinforcing Bars (New Billet): 3.35c, mill, except: 3.55c, Monessen, Pa., 4.05c, Pittsburg, Torrance, Calif. 4.10c, Atlanta, Ga., Seattle, S. San Francisco, Los Angeles. Fabricated: To consumers: 4.10c, mill, except: 4.85c, Seattle.

Reinforcing Bars (Rail Steel): 4.65c, Williamsport, Pa., mill; 5.25c, Huntington, W. Va.

Wrought Iron Bars: Single Refined: 8.60c, (hand puddled), McKees Rocks, Pa., mill; 9.50c, Economy, Pa., mill. Double Refined: 11.25c (hand puddled), McKees Rocks, Pa., mill; 11.00c, Economy, Pa. Staybolt: 12.75c, (hand puddled), McKees Rocks, Pa.; 11.30c, Economy, Pa.

Hot-Rolled Ingot Iron Bars: 3.60c, mill.

Sheets

Hot-Rolled Sheets (18 gage and heavier): 3.25c, mill, except: 3.25-3.30c, Cleveland; 3.45c, Ecorse, Mich.; 3.95c, Pittsburg, Torrance, Calif.; 5.00c, Conshohocken, Pa.; 5.65c, Fontana, Calif.

Hot-Rolled Sheets (19 gage and lighter, annealed): 4.15c, mill, except: 4.40c, Alabama City, Ala.; 4.65c, Niles, O., 5.05c, Torrance, Calif.

Cold-Rolled Sheets: 4.00c, mill, except: 4.20c, Granite City, Ill., Ecorse, Mich., 4.95c, Pittsburg, Calif.

Galvanized Sheets, No. 10: (Based on 5 cent zinc) 4.40c, mill, except: 5.00c, Niles, O.; 5.15c, Pittsburg, Torrance, Calif.

Galvannealed Sheets: 4.95c, mill, except: 5.55c, Niles, O.

Culvert Sheets, No. 16 flat Copper Steel (based on 5-cent zinc) 5.00c, mill, except: 5.40c, Granite City, Ill.; 5.75c, Pittsburg, Torrance, Calif.

Copper-iron: 5.74c, Granite City, Ill.

Aluminized Sheets: Hot-dipped, coils or cut to lengths: 7.75c, mill.

Long Ternes, No. 10 (Commercial quality): 4.80c, mill.

Long Ternes Ingot Iron: 5.20c, mill.

Enameling Sheets, No. 12: 4.40c, mill, except: 4.60c, Granite City, Ill., 4.70c, Ecorse, Mich.; 6.00c, Niles, O.

Silicon Sheets, No. 24: Field: 5.15c, mill. Armature: 5.45c, mill, except: 5.65c, Granite City, Ill.; 6.05c, Niles, O.

Electrical: Hot-rolled, 5.95c, mill, except: 6.15c, Granite City, Ill.; 6.55c Niles, O. Cold-rolled, 6.20c, mill.

Motor: 6.70c, mill except: 6.90c, Granite City, Ill.

Dynamo; 7.50c, mill, except: 7.40c, Follansbee, W. Va., Toronto, O.; 7.70c, Granite City, Ill. Transformer 72, 8.05c, mill, except: 7.90c, Follansbee, W. Va., Toronto, O. 65, 8.60c, mill. 58, 9.30c, mill. 52, 10.10c, mill.

High-Strength Low-Alloy Sheets: Hot-rolled, 4.95c, mill, except: 5.25c, Ecorse, Mich., and Conshohocken, Pa., mills.

Galvanized (No. 10), 6.75c, mill.

Cold-rolled, 6.05c, mill, except: 6.35c, Ecorse, Mich.

Ingot Iron Sheets (18 gage and heavier): Hot-rolled, 3.50c, mill, Cold-rolled, 4.50c, mill. Galvanized, 4.65c, mill, except: 4.95c, Indiana Harbor, Ind.

Strip

Hot-Rolled Strip: 3.25c mill, except: 3.30c, Chicago, Cleveland, Pittsburgh; 3.25-3.35c,* Sharon, Pa.; 3.45c, Ecorse, Mich., Atlanta, Ga.; 3.60c, Detroit; 3.70c, West Leechburg, Pa.; 4.00c, Pittsburg, Torrance, Calif.; 4.25c, Seattle, S. San Francisco, Los Angeles; 5.90c, Fontana, Calif.

*6-in. and narrower; wider than 6-in., respectively.

Cold-Rolled Strip (0.25 carbon and less): 4.00c, mill, except: 4.20c, Ecorse, Mich.; 4.25c, Chicago, Warren, O.; 4.40-4.50c, Detroit; 4.50c, New Haven, Conn., West Leechburg, New Castle, Pa., Boston; 4.75c, Dover, O.; 5.75c, Los Angeles; 7.10c, Fontana, Calif.

Hot-Rolled Alloy: 5.10c, mill.

Cold-Rolled Alloy Strip: 9.50c, mill, except 9.80c, Worcester, Mass.

Cold-Finished Spring Steel: 0.26-0.40 C, 4.00c, mill, except: 4.30c, Worcester, Mass., 4.75c, Wallingford, Conn.; over 0.40 to 0.60 C, 5.50c, mill, except: 5.80c, Worcester, Mass., Wallingford, Conn.; over 0.60 to 0.80 C, 6.10c, mill, except: 6.40c, Worcester, Mass., Bristol, Wallingford, Conn.; over 0.80 to 1.05 C, 8.05c, mill, except: 8.35c, Worcester, Mass., Bristol, Conn.; over 1.05 to 1.35 C, 10.35c, mill, except: 10.30c, Wallingford, Conn.; 10.65c, Worcester, Mass.

High-Strength, Low-Alloy Strip: Hot-rolled, 4.95c, mill, except: 5.25c, Ecorse, Mich., mill. Cold-rolled, 6.05c, mill, except: 6.35c, Ecorse, Mich., mill.

Tin, Terne Plate

Tin Plate: American Coke, per base box of 100 lb, 1.25 lb coating $6.60-$6.80; 1.50 lb coating $6.80-$7.00. Pittsburg, Calif., mill $7.35 and $7.55, respectively, for 1.25 and 1.50 lb coatings.

Electrolytic Tin Plate: Per base box of 100 lb. 0.25 lb tin, $5.80-$6.00; 0.50 lb tin, $6.00-$6.20; 0.75 lb tin, $6.20-$6.40.

Can Making Black Plate: Per base box of 100 lb. 55 to 70 lb basis weight, $5.20-$5.30; 75 to 95 lb basis weight, $5.10-$5.20; 100 to 128 lb basis weight, $5.20-$5.30. $5.95, $5.85, $5.95, respectively, Pittsburg, Calif.

Holloware Enameling Black Plate: 29-gage, 4.75-4.95c per lb.

Manufacturing Ternes (Special Coated): Per base box of 100 lb, $5.90-$6.10.

Roofing Ternes: Per package 112 sheets; 20 x 28 in., coating I.C. 8-lb $15.50.

Plates

Carbon Steel Plates: 3.40c, mill, except: 3.40-3.60c, Cleveland; 3.45c, Sparrows Point, Md.; 3.60c, Pittsburgh, Aliquippa, Pa.; 3.65c, Ecorse, Mich.; 3.75c, Coatesville, Pa.; 3.95c, Claymont, Del., Conshohocken, Pa.; 4.80c, Seattle; 5.80c, Fontana, Calif.; 5.85c, Harrisburg, Pa.

Floor Plates: 4.55c, mill.

Open-Hearth Alloy Plates: 4.40c, mill, except: 5.10c, Coatesville, Pa., mill.

High-Strength, Low-Alloy Plates: 5.20c mill, except: 5.10c, Coatesville, Pa.; 5.30c, Conshohocken, Pa., Sparrows Point, Md., Johnstown, Pa.; 5.65c, Ecorse, Mich.

Shapes

Structural Shapes: 3.25c, mill, except 3.30c, Bethlehem, Pa., Lackawanna, N. Y., Johnstown, Aliquippa, Pa., 3.85c, Torrance, Calif.; 4.30c, Seattle, S. San Francisco, Los Angeles; 5.75c, Fontana, Calif.

Beams, Wide Flange: 3.20c, mill, except: 3.30c, Bethlehem, Aliquippa, Pa.

Alloy Structural Shapes: 4.05c, mill.

Steel Sheet Piling: 4.05c, mill.

High-Strength, Low-Alloy Shapes: 4.95c, mill, except: 5.05c, Bethlehem, Johnstown, Pa., Lackawanna, N. Y.

Wire and Wire Products

Wire to Manufacturers (carloads): Bright, Basic or Bessemer Wire, 4.15c, mill, except: 4.00c, Atlanta, Ga.; 4.25c, Sparrows Point, Md.; 4.45c, Worcester, Mass.; 4.50c, Monessen, Pa.; 4.70c, Portsmouth, O.; 5.10c, Pittsburg, Calif.; 5.40c, Shelton, Conn.

Basic MB Spring Wire, 5.55c, mill, except: 5.65c, Sparrows Point, Md., Monessen, Pa.; 5.85c, Worcester, Mass., Trenton, N. J., 6.50c, Pittsburg, Calif., 5.30c, Portsmouth, O.

Upholstery Spring Wire, 5.20c mill, except: 5.30c, Sparrows Point, Md., Williamsport, Pa.; 5.50c, Worcester, Mass., Trenton, N. J., New Haven, Conn.; 6.15c, Pittsburg, Calif.

Wire Products to Trade (carloads): Merchant Quality Wire: Annealed (6 to 8 Gage base), 4.80c, mill, except: 4.90c, Sparrows Point, Md., 4.95c, Monessen, Pa.; 5.10c, Worcester, Mass.; 5.20c, Atlanta, Ga.; 5.75c, Pittsburg, Calif. Galvanized (6 to 8 Gage base), 5.25c, mill, except: 5.35c, Sparrows Point, Md.; 5.40c, Monessen, Pa.; 5.55c, Worcester, Mass.; 5.65c, Atlanta, Ga.; 6.20c, Pittsburg, Calif.

Nails and Staples: Standard, cement-coated and galvanized nails and polished and galvanized staples, Column 103, mill, except: 105, Sparrows Point, Md.; 109 Worcester, Mass.; 110 Atlanta, Ga.; 117, Portsmouth, O.; 123, Pittsburg, Calif.; 124, Cleveland; 126, Monessen, Pa.; $5.20 per 100 pound keg, Aliquippa, Pa.; $6.75, Conshohocken, Pa., Wheeling, W. Va.

Woven Fence (9 to 15½ Gage, inclusive): Column 109, mill, except: 113 Monessen, Pa.; 121 Atlanta, Ga.; 132, Pittsburg, Calif.

Barbed Wire: Column 123 mill, except: 125, Sparrows Point, Md.; 126 Atlanta, Ga.; 128 Monessen, Pa.; 143, Pittsburg, Calif.

Fence Posts (with clamps): Column 114, Duluth; 115, Johnstown, Pa.; 116, Moline, Ill.; $123.50 per net ton, Williamsport, Pa.

Bale Ties (single loop): Column 106, mill, except: 108, Sparrows Point, Md.; 110, Atlanta, Ga.; 130, Pittsburg, Calif.

Tubular Goods

Standard Steel Pipe: Mill prices in carlots, threaded and coupled, to consumers about $200 a net ton.

	Butt Weld			Butt Weld	
In.	Blk.	Gal.	In.	Blk.	Gal.
⅛	41½	12½	1¼	46½–	24–
¼	39½	14		49	32
⅜	36	9	1½	47–	24½–
½	40½–	16½–		49½	32½
	43	24½	2	47½–	25–
¾	43½–	25½–		50	33
	46	28½	2½, 3	48–	25½–
1	46–	23½–		50½	33½
	48½	31½	3½ & 4	44½	25

	Lap Weld		Elec. Weld		Seamless	
In.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
2	39½	20	38½	19	27–	7½–
					38½	19
2½	42½–	23–	41½	22	32½–	13–
	43½	24			41½	22
3	42½–	23–	41½	22	35–	15½–
	43½	24			41½	22
3½ & 4	42½–	25–	43½	24	38½–	19–
	46½	27			43½	24
5 & 6	42½–	23–	43½	24	38½–	19–
	44½	25			43½	24
7	....	..	....	..	43½	23

Line Steel Pipe: Mill prices in carlots to consumers about $200 a net ton.

	Butt Weld			Butt Weld	
In.	Blk.	Gal.	In.	Blk.	Gal.
⅛	40½	....	1¼	47–	28–
¼	38½	....		48	29
⅜	35	....	1½	47½–	28½–
½	41–	20½–		48½	29½
	42	21½	2	48–	29–
¾	44–	24½–		49	30
	45	25½	2½ & 3	48½–	29½–
1	46½–	27½–		49½	30½
	47½	28½	3½ & 4	43½	

	Lap Weld		Elec. Weld		Seamless	
In.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
2	38½	19	37½	18	26–	6½–
					37½	18
2½	41½–	23	40½	..	31½–	12–
	42½				40½	21
3	41½–	23	40½	..	34–	14½–
	42½				40½	21
3½–4	41½–	22–	42½	..	37½–	18–
	45½	26			42½	23
5 & 6	41½–	22	42½	..	40½–	20–
	43½	..			44½	24
8	45½	..	44½	24	41½–	21–
10	45	..	44	23	44	23½
12	44	..	44½	..	40½–	20
					43	22½

Standard Wrought Iron Pipe: Mill price in carlots, threaded and coupled, to consumers about $200 a net ton.

	Butt Weld			Lap Weld	
In.	Bulk.	Gal.	In.	Bulk.	Gal.
⅜	+59½	+85	1¼	+22	+42½
½	+20½	+42	1½	+15½	+35
¾	+10½	+31	2	+ 7½	+26
1 and			2½-3½	+ 5	+21.5
1¼	+ 4½	+22	4	List	+15½
1½	— 1½	+18½*	4½-8	+ 2	+17
2	— 2	+18	9-12	+12	+26½

Boiler Tubes: Net base c.l. prices, dollars per 100′, mill; minimum wall thickness, cut lengths 4 to 24″; inclusive.

		Seamless		Elec. Weld	
O.D. In.	B.W. Ga.	Hot Rolled	Cold Drawn	Hot Rolled	Cold Drawn
1	13	....	13.39	13.00	13.00
1¼	13	....	15.87	13.21	15.39
1½	13	$15.05	17.71	14.60	17.18
1¾	13	17.11	20.15	16.60	19.54
2	13	19.18	22.56	18.60	21.89
2¼	13	21.37	25.16	20.73	24.40
2¼	12	23.54	27.70	22.83	26.88
2½	12	25.79	30.33	25.02	29.41
2¾	12	27.33	32.14	26.51	31.18
3	12	28.68	33.76	27.82	32.74
3¼	11	33.39	39.29	32.39	38.11
3½	11	35.85	42.20	34.78	40.94
4	10	44.51	52.35	43.17	50.78
4½	9	58.99	69.42	....	....
5	9	68.28	80.35	....	....
6	7	104.82	123.33	....	....

Rails, Supplies

Rails: Standard, over 60-lb: $3.20 per 100 lb, mill.

Light (billet): $3.55 per 100 lb, mill.

Light (rail steel): $4.70 per 100 lb., Williamsport, Pa.

Relaying, 60 lb and over: $64-$69 per net ton, f.o.b. warehouse.

Railroad Supplies: Track bolts, treated: $8.50 per 100 lb., mill. Untreated: $8.25, mill, except: $7.50, Fairfield, Ala.

Tie Plates: 4.05c mill, except: 4.20c, Pittsburg, Calif.; 4.50c, Seattle.

Splice Bars: 4.25c, mill.

Standard Spikes: 5.35c, mill, except: 5.25c, Pittsburgh.

Axles: 5.20c, mill.

Bolts, Nuts

Prices to consumers, f.o.b. midwestern plants. Sellers reserve right to meet competitors' prices, if lower. Additional discounts on carriage and machine bolts, 5 for carloads; 15 for full containers, except tire and plow bolts.

Carriage and Machine Bolts

½-in. and smaller; up to 6 in. in length	35 off
⅝ and ¾ x 6-in. and shorter	37 off
⅝-in. and larger x 6-in. and shorter	34 off
All diameters longer than 6-in.	30 off
Tire bolts	25 off
Plow bolts	47 off
Lag bolts, 6 in. and shorter	37 off
Lag bolts, longer than 6 in.	35 off

Stove Bolts

In packages, nuts separate, 58½-10 off; bulk 70 off on 15,000 of 3-in. and shorter, or 5000 over 3 in., nuts separate.

Nuts

Semifinished hexagon	A.S. Light	A.S. Reg. and Heavy
⅜-in. and smaller	41 off	.....
½-in. and smaller	.....	38 off
½-in.-1-in.	39 off	.....
⅝-in.-1-in.	.....	37 off
1⅛-in.-1½-in.	37 off	35 off
1⅝-in. and larger	34 off	28 off

Additional discount of 15 for full containers.

Hexagon Cap Screws (Packaged)

Upset 1-in. smaller by 6-in. and shorter (1020 bright)	46 off
Upset (1035 heat treated)	
⅝ and smaller x 6 and shorter	40 off
¾, ⅞, & 1 x 6 and shorter	35 off

Square Head Set Screws

Upset 1-in. and smaller	51 off
Headless, ¼-in. and larger	31 off

Rivets

F.o.b. midwestern plants.

Structural ½-in. and larger	6.75c
⅜-in. and under	48 off

Washers, Wrought

Fob shipping point, to jobbers.....$1-$2 off

Tool Steels

Tool Steel: Cents per pound, producing plants; reg. carbon 19.00c; extra carbon 22.00c; special carbon 26.50c; oil-hardening 29.00c; high carbon-chromium 52.00c; chrome hot work, 29.00c.

W	Cr	V	Mo	Co	Base Per lb
18	4	1	...	...	90.50c
18	4	2	...	...	102.5c
18	4	3	...	...	114.5c
18	4	2	...	9	168.5c
1.5	4	1	8.5	...	65.00c
6.4	4.5	1.9	5	...	69.50c
6	4	3	6	...	88.00c

Stainless Steels

Mill prices, cents per lb. New price schedules pending.

CHROMIUM NICKEL STEELS

Grade	Bars, Wire, Shapes	Plate	Sheets	Hot Rolled Strip	Cold Rolled Strip
301	28.75	32.50	40.75	24.25	32.00
302	28.75	32.50	40.75	25.75	33.75
303	31.50	34.75	43.00	32.50	39.75
304	31.25	34.75	43.00	28.00	35.75
308	34.75	40.75	49.00	34.00	43.00
309	43.00	48.00*	56.25	44.00	56.25
310	59.00	62.25†	63.25	52.25	57.25
316	48.00	53.00	57.25	47.85	57.25
317	60.00	64.50	69.50	....	39.50
321	34.75	40.75	49.00	35.25	45.75
347	39.75	45.75	54.00	39.50	50.25
403	26.00	29.75	35.25	....	32.50
405	24.25	27.50	33.75	....	32.00

STRAIGHT CHROMIUM STEEL

410, 414	22.75	26.00	32.00	20.25	26.50
416	23.25	26.50	32.50	22.00	28.25
420	28.75	34.25	40.25	28.50	43.50
430	23.25	26.50	34.75	21.00	27.00
430F	23.75	27.00	35.25	22.50	29.75
431	23.25	26.50	34.75	....	27.00
440A, B, C	28.75	34.25	40.25	....	43.50
442	27.00	31.00	39.25	....	38.50
446	33.00	36.50	46.50	....	62.25
501§	10.00	14.50	19.25	14.25	20.50
502§	11.00	16.00	20.50	16.00	21.50

§ Low chromium.

RAW MATERIAL AND FUEL PRICES

Minimum delivered prices do not include 3 per cent federal tax.

Pig Iron

Per Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem, Pa., furnace	$44.00	$44.50	$45.00	$45.50
Newark, N. J., del.	46.39	46.89	47.39	47.89
Brooklyn, N. Y., del.	....	48.40	48.90	....
Philadelphia, del.	46.17	46.67	47.17	47.67
Birmingham, furnace	42.88	43.38	....	....
Cincinnati, del.	....	49.09	....	....
Buffalo, furnace	44.00	44.00	44.50	45.00
Boston, del.	52.42	52.42	52.92	....
Rochester, del.	46.22	46.22	46.72	47.22
Syracuse, del.	47.025	47.025	47.525	48.025
Chicago, furnace	42.50-43.00	43.00-43.50	43.50	44.00
Milwaukee, del.	44.22-44.72	44.72-45.22	45.22	45.72
Muskegon, Mich., del.	....	49.65-50.15	50.15	....
Cleveland, furnace	43.00	43.50	43.50	44.00
Akron, del.	45.17	45.67	45.67	46.17
Duluth, furnace	43.00	43.50	44.00	44.50
Erie, Pa., furnace	42.50	43.00	43.50	44.00
Everett, Mass., furnace	....	48.75	49.25	....
Geneva, Utah, furnace	43.00	43.50	....	....
Seattle, Tacoma, Wash., del.	....	50.63	....	....
Portland, Oreg., del.	....	50.63	....	....
Los Angeles, San Francisco.	50.13	50.63	....	....
Granite City, Ill., furnace	47.90	48.40	48.90	....
St. Louis, del.	48.65	49.15	49.65	....
Ironton, Utah, furnace	....	43.50	....	....
‡**Neville Island, Pa.,** furnace	46.00	46.50	46.50	47.00
Pittsburgh, del., N.&S. Sides	47.08	47.58	47.58	48.08
Pittsburgh (Carnegie), furnaces	43.00	43.50	43.50	44.00
Sharpsville, Pa., furnace	43.00	43.50	43.50	44.00
Steelton, Pa., furnace	44.00	44.50	45.00	45.50
Struthers, O., furnace	42.50	....	....	....
Swedeland, Pa., furnace	50.00	50.50	51.00	....
Toledo, O., furnace	42.50	43.00	43.50	44.00
Cincinnati, del.	47.05	47.55	....	....
Youngstown, O., furnace	43.00	43.50	43.50	44.00
Mansfield, O.	46.87	47.37	47.37	47.87

‡ To Neville Island base add: $0.86 for McKees Rocks, Pa.; $1.31 Lawrenceville, Homestead, McKeesport, Monaco; $1.73 Verona; $1.94 Brackenridge; $1.08 to Ambridge and Aliquippa.

Blast Furnace Silvery Pig Iron

6.00-6.50 per cent Si (base).$56.50
6.51-7.00.. 57.75 9.01- 9.50. 64.00
7.01-7.50.. 59.00 9.51-10.00. 65.25
7.51-8.00.. 60.25 10.01-10.50. 66.50
8.01-8.50.. 61.50 10.51-11.00. 67.75
8.51-9.00.. 62.75 11.01-11.50. 69.00

Fob Jackson, O., per gross ton. Buffalo furnace $1.25 higher.

Bessemer Ferrosilicon

Prices same as for blast furnace silvery iron, plus $1 per gross ton.

Electric Furnace Silvery Pig Iron Si 14.01-14.50%, $81.75 furnace, Niagara Falls; $81 open-hearth and $82 foundry grade, Keokuk, Iowa. Add $1 a ton for each additional 0.5% Si to 18%; 50c for each 0.5% Mn over 1%; $1 a ton for 0.045% max. phos.

Charcoal Pig Iron

Semi-cold blast, low phosphorus. Fob furnace, Lyles, Tenn.....$62 (For higher silicon iron a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Low Phosphorus

Steelton, Pa., Buffalo, Troy, N. Y., $50. Philadelphia $52.81, delivered. Intermediate phosphorus, Central furnace, Cleveland, $48.00.

Differentials

Prices are subject to following differentials:

Silicon: An additional charge of 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.7) per cent and over.

Manganese: An additional charge of 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

Nickel: An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

Fluorspar

Metallurgical grade, fob shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $35; less than 60% $32.

Metallurgical Coke

Price per Net Ton

Beehive Ovens

Connellsville, furnace . $13.50-15.50
Connellsville, foundry. 16.00- 18.00
New River, foundry... 16.50
Wise county, foundry.. 15.35
Wise county, furnace.. 14.60
† Nominal.

Oven Foundry Coke

Kearney, N. J., ovens. $21.50
Chicago, ovens 20.40
Terre Haute, ovens.... 21.00
Milwaukee, ovens 21.15
New England, del..... 22.75
Birmingham, del. 17.86
Indianapolis, ovens ... 20.85
Cincinnati, del. 21.40
Ironton, O., ovens 18.25
Erie, Pa., del. 22.45
Painesville, O., ovens.. 20.90
Cleveland, del. 22.45
Buffalo, del. 23.10
Detroit, del. 21.65
Philadelphia, ovens ... 20.55
Swedeland, Pa., ovens . 20.50
Portsmouth, O., ovens. 19.25

Coal Chemicals

Spot, cents per gallon, ovens
(Price effective as of Aug. 5)

Pure benzol 20.00
Toluol, one degree 20.50-26.50
Toluol, two degrees ... 23.00-26.50
Industrial xylol 20.50-26.50

Per pound, ovens

Phenol, 40 (car lots, returnable drums) 13.00
Do., less than carlots 13.75
Do., tank cars 12.00
Naphthalene flakes, balls, bbl. to jobbers, "household use" 12.00

Per ton, bulk, ovens

Sulphate of ammonia . $45.00

Refractories

(Prices per 1000 brick, fob plant)

Fire Clay Brick

Super Duty: St.Louis, Vandalia, or Farber, Mo., Olive Hill, Ky., Clearfield, or Curwensville, Pa., $100.

High-Heat Duty: Salina, Pa., $85; Woodbridge, N. J., St. Louis, Farber, or Vandalia, Mo., West Decatur, Orviston, Clearfield, Beach Creek, or Curwensville, Pa., Olive Hill, Hitchins, Haldeman, or Ashland, Ky., Troup, or Athens, Tex., Stevens Pottery, Ga., Portsmouth, or Oak Hill, O., $80.

Intermediate-Heat Duty; St. Louis, or Vandalia, Mo., West Decatur, Orviston, Beach Creek, or Clearfield, Pa., Olive Hill, Hitchins, Haldeman, or Athens, Ky., Troup, Tex., Stevens Pottery, Ga., or Portsmouth, O., $74.

Low-Heat Duty: Oak Hill, or Portsmouth, O., Clearfield, Pa., Bessemer, Ala., $66.

Ladle Brick

Pennsylvania, Illinois, Ohio, West Virginia

Dry Press: $55.
Wire Cut: $53.

Malleable Bung Brick

St. Louis, Mo., Olive Hill, Ky., $83; Beach Creek, Pa., $73.

Silica Brick

Mt. Union, Claysburg, or Sproul, Pa., Ensley, Ala., $80; Hays, Pa., $85; Joliet or Rockdale, Ill., $89; Lehi, Utah, Los Angeles, $95.
Eastern Silica Coke Oven Shapes: Claysburg, Mt. Union, Sproul, Pa., $80.
Illinois Silica Coke Oven Shapes: Joliet or Rockdale, Ill., $81.

Basic Brick

(Base prices per net ton; f.o.b. works, Baltimore or Chester, Pa.)
Chrome brick or chemical-bonded chrome brick, $69, magnesite brick, $91; chemical-bonded magnesite, $80.

Magnesite

(Base prices per net ton, fob works, Chewelah, Wash.)
Domestic dead-burned, ¾" grains: Bulk, $31; single paper bags, $35.50.

Dolomite

(Base prices per net ton)
Domestic, dead-burned, bulk: Billmeyer, Blue Bell, Williams, Plymouth Meeting, Pa., Millville, W. Va., Narlo, Millersville, Martin, Gibonsburg, Woodville, O., $11.85; Thornton, McCook, Ill., $11.95; Dolly Siding, Bonne Terre, Mo., $12.05.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (natural) Lower Lake Ports

(Any increase or decrease in R. R. freight rates, dock handling charges and taxes thereon effective after Apr. 1, 1948, are for buyer's account.)
Old range bessemer $6.60
Old range nonbessemer 6.45
Mesabi bessemer 6.35
Mesabi nonbessemer 6.20
High phosphorus 6.20

Eastern Local Ore

Cents, units, del. E. Pa.
Foundry and basic 56.62% contract 15.25

Foreign Ore

Cents per unit, cif Atlantic ports
Swedish basic, 60 to 68% 14.50
Brazil iron ore, 68-69% 18.50

Tungsten Ore

Wolframite and scheelite per short ton unit, duty paid ..... $26-$28

Manganese Ore

48-50%, duty paid, fob cars, New York, Philadelphia, Baltimore, Norfolk, Va., Mobile, Ala., New Orleans, 67.60c-72.60c.

Chrome Ore

Gross ton fob cars, New York, Philadelphia, Baltimore, Charleston, S.C., plus ocean freight differential for delivery to Portland, Oreg., and/or Tacoma, Wash. (S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African
48% 2.8:1 ..... $37.50
48% 3:1 ..... 39.00
48% no ratio 31.00

South African (Transvaal)
44% no ratio .....$25.50-$26.00
45% no ratio 26.50
48% no ratio 29.00-30.00
50% no ratio 29.50-30.50

Brazilian—nominal
44% to 2.5:1 lump..... $33.65

Rhodesian
45% no ratio .....$27-$27.50
48% no ratio 30.00
48% 3:1 lump 39.00

Domestic (seller's nearest rail)
48% 3:1 ..... $39.00

Molybdenum

Sulphide conc., lb., Mo., cont., Mines $0.75

WAREHOUSE STEEL PRICES

Prices, cents per pound, for delivery within switching limits, subject to extras.

	SHEETS			STRIP		BARS				PLATES	
	H-R 10 Ga.	C-R 17 Ga.	Gal. *10 Ga.	†H-R	†C-R	H-R Rds. ⅝" to 3"	C-F Rds. ½" & up	H-R Alloy **4140	Standard Structural Shapes	Carbon ⅜"–¾"	Floor ⅝" & Thicker
Boston (city)	5.84	6.64	7.84	6.04	6.90	5.69	6.39	8.24-9.74	5.54	5.89	7.34
Boston (c'try) ...	5.69	6.49	7.69	5.89	6.75	5.54	6.24	8.09-9.59	5.39	5.74	7.19
New York (city)	5.73-5.80	6.73	7.74-7.83	6.08-6.28	...	5.83	6.58	8.22	5.52-5.78	5.98	7.48
New York (c'try)	5.53-5.60	6.53	7.54-7.63	5.88-6.08	...	5.63	6.38	...	5.32-5.58	5.78	7.28
Phila. (city) ...	5.50-5.86	6.61-6.81	7.42-7.62	5.60-5.81	...	5.57-5.65	6.31	7.94	5.24-5.35	5.52-5.65	7.16
Phila. (c'try) ..	5.35-5.71	6.46-6.66	7.27-7.47	5.45-5.66	...	5.42-5.50	6.16	7.79	5.09-5.20	5.37-5.50	7.01
Balt. (city)	5.43†	6.33	7.53	5.49	...	5.54	...	...	5.48	5.68	7.13
Balt. (c'try)	5.28†	6.18	7.38	5.34	...	5.39	...	...	5.33	5.33	6.98
Norfolk, Va.	5.75	...	...	...	...	6.00	7.00	...	6.00	6.00	7.50
Buffalo (city) ..	5.25	6.00[8]	7.75	5.70	...	5.35	6.05	...	5.25	5.61	...
Buffalo (c'try) ..	5.10	5.85[8]	7.60	5.55	...	5.20	5.90	...	5.10	5.46	...
Pitts (w'house)..	4.85-5.00§	5.75-5.85[8]	7.00-7.05	5.00-5.35	5.95-6.00	4.90-5.10	5.65	7.65	4.90-5.15	5.05-5.25	6.55
Detroit (w'house)	5.40§	6.30	7.60	5.40	...	5.45	6.17	8.12	5.45	5.65	7.10
Cleveland (del.).	5.13-5.29	6.00-6.29	7.34-7.49	5.17-5.69	6.[illegible]	5.30-5.34	6.05-6.10	7.94-8.29	5.34-5.60	5.50-5.54	6.95-6.99
Cleveland (w'hse)	4.98-5.75	5.75-6.14	7.19-7.85	5.02-5.54	[illegible].0	5.15-5.19	5.90-5.95	7.79-8.14	5.19-5.45	5.35-5.39	6.80-6.84
Cincinnati (w'hse)	5.26	6.11	7.60	5.52	6.07	5.52	6.07	...	5.37	5.61	6.91
Chicago (city) ..	5.20	5.90‡[8]	7.20	5.00	6.30	5.05	5.85	7.80[9]	5.05	5.25	6.70
Chicago (w'house)	5.05	5.75‡[8]	7.[illegible]	4.85	6.15	4.90	5.70	7.65[9]	4.90	5.10	6.55
Milwaukee (city).	5.37	6.07†[8]	7.37	5.17	6.47	5.22	6.02	7.97[9]	5.22	5.42	6.87
St. Louis (del.)..	5.34§	6.24[8]	7.44	5.34	6.64	5.39	6.19[12]	6.64	5.39	5.59	7.04
St. Louis (w'hse)	5.19§	6.09[8]	7.29	5.19	6.49	5.24	6.04[12]	9.49	5.24	5.44	6.89
Birm'ham (city).	5.20§	...	6.60	5.20	...	5.15	6.66	...	5.15	5.40	7.41
Birm'ham (c'try)	5.05§	...	6.45	5.05	...	5.00	6.51	...	5.00	5.25	7.26
Omaha, Nebr. ..	6.07	...	9.33	6.07	...	6.12	6.92	...	6.12	6.32	7.77
Los Angeles (city)	6.55§	8.05	8.20†	6.75	9.50	6.20	8.00-8.50	...	6.70	6.40	8.15
Los Angeles (w'house) ...	6.40§	7.90	8.05†	6.60	9.35	6.05	7.85-8.35	...	6.55	6.25	8.00
Seattle-Tacoma .	6.35[17]	7.90[8]	8.40	6.70[17]	...	6.20[17]	8.15[1]	9.45[2]	6.30[17]	6.35[17]	8.40[17]

Base Quantities: 400 to 1999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold finished bars, 1000 lb and over; galvanized sheets, 45C to 1499 lb; [1]—1500 lb and over; [2]—1000 to 4999 lb; [3]—450 to 39,999 lb; [4]—three to 24 bundles; [5]—450 to 1499 lb; [6]—400 to 14,999 lb; [8]—400 to 1499 lb; [9]—1000 to 1999 lb; [11]—1000 to 39,999 lb; [12]—1000 lb and over; [15]—2000 lb and over; [17]—300 to 9999 lb; [18]—1500 to 1999 lb; [19]—1500 to 39,999 lb; [20]—400 to 3999 lb; [21]—400 lb and over; [22]—500 to 1499 lb; [23]—Price (but not other price in range) applies to any and all quantities.

* Includes gage and coating extra, except Birmingham (coating extra excluded); † does not include gage extras; ‡ 15 gage; § 18 gage and heavier; ** as rolled; †† add 0.40 for sizes not rolled in Birmingham.

PRICES OF LEADING FERROALLOYS PRODUCTS

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si) Carlot per gross ton, $57, Palmerton, Pa., $56, Pittsburgh and Chicago; (16% to 19% Mn.) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.). Carload, lump, bulk $145 per gross ton of alloy, Alloy, W. Va., Welland Ont., Sheridan, Pa., and Lynchburg, Va.; $147 Johnstown, Pa., mill. Carload, lump, bulk, $150 fob Rockwood, Tenn.; $148 fob Aetna, Pa. Add or subtract $1.80 for each 1%, or fraction thereof, of contained manganese over 82% or under 78%. West Coast Prices: Carload (80,000 lb or more), lump, bulk, same price and basing points as above. All other prices for shipment from Pacific Coast warehouses, add $26.21 to above prices. Delivery is fob Portland, Los Angeles, South San Francisco, or Seattle warehouses, with freight allowed on shipments of 25 gross tons or more.

Low-Carbon Ferromanganese, Regular Grade: (Mn 80-85%). Eastern Zone, carload, lump, bulk, max. 0.10% C, 22.5c per lb of contained Mn, carload packed 23.25c, ton lot 24.35c, less ton 25.55c; Central, add 0.3c for c.l. and 1.1c for l.c.l. Western, add 0.7c for c.l. and 4.4c for l.c.l. Freight allowed. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 0.75% C—max. 7% Si. **Special Grade:** (Mn 90% approx., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%. C 1.5% max., Si 1.5% max.). Eastern Zone, carload, lump, bulk 16.5c per lb of contained Mn, carload packed 17.25c, ton lot 18.35c, less ton 19.55c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.7c for c.l. and 4.4c for l.c.l. Freight allowed. Spot, add 0.25c.

Manganese Metal: (Mn 96% min., Fe 2% max., Si 1% max., C 0.20% max.). Eastern Zone, carload, 2" x D, bulk 32c per lb of metal, carload packed 32.5c, ton lot 34c, less ton 36c; Central, add 1c for c.l. and 1.45c for l.c.l.; Western, add 1.45c for c.l. and 2.4c for l.c.l. Freight allowed. Spot, add 2c.

Silicomanganese: (Mn 65-70%). Eastern Zone. contract, lump, bulk, 1.50% C grade, 17-20% Si, 7.8c per lb of alloy, carload packed, 8.55c, ton lot 9.45c, less ton 10.45; Central, add 0.25c for c.l. and 0.6c for l.c.l.; Western, add 0.8c for c.l. and 2.5c for l.c.l. Freight allowed. For 2.0% C grade, Si 15-17%, deduct 0.2c from above prices. Spot, add 0.25c.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Eastern Zone, contract, c.l., lump, bulk 18.6c per lb of contained Cr, c.l., packed 19.5c, ton lot 20.65c, less ton 22.05c; Central, add 0.4c for c.l. and 1.3c for l.c.l.; Western, add 0.55c for c.l. and 2.1c for l.c.l. Freight allowed. Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%, Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

Foundry Ferrochrome: (Cr 62-66%, C 5-7%). Eastern Zone, contract, c.l., 8MxD, bulk 20.1c per lb of contained Cr, c.l., packed 21.0c, ton lot 22.35c, less ton 24.1c; Central, add 0.4c for c.l. and 1.3c for l.c.l.; Western, add 0.55c for c.l. and 2.1c for l.c.l. Freight allowed. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Eastern Zone, contract, carload, lump, bulk, max. 0.03% C 28.5c per lb of contained Cr, 0.04% C 27.5c, 0.05% C 27.0c, 0.06% C 26.5c, 0.10% C 26.0c, 0.15% C 25.5c, 0.20% C 25.25c, 0.50% C 25.0c, 1% C 24.5c, 2% C 24.25c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c; Central, add 0.4c for c.l. and 0.65c for l.c.l.; Western, add 0.5c for c.l. and 1.85c for l.c.l. Freight allowed. Spot, add 0.25c.

"SM" Low-Carbon Ferrochrome: (Cr 62-66%, Si 4-6%, Mn 4-6%, add C 1.25% max.). Eastern Zone, contract, carload, lump, bulk 25c per lb of contained chromium, carload, packed 26.1c, ton lot 27.3c, less ton 29.1c; Central, add 0.4c for c.l. and 0.65c for l.c.l.; Western, add 0.5c for c.l. and 1.85c for l.c.l. Freight allowed. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 2c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. Add 2c for each 0.25% of N above 0.75%.

Chromium Metal: (Mn 97% Cr and 1% Fe). Eastern Zone, contract, carload, 1" x D; packed, max. 0.50% C grade, 93c per lb of contained chromium, ton lot 94.5c, less ton 97c; Central, add 1.5c, for c.l. and 2.5c for l.c.l.; Western, add 2.75c for c.l. and 4.5c for l.c.l. Freight allowed. Spot, add 5c.

SILICON ALLOYS

20-30% Ferrosilicon: Contract, carload, lump, bulk, 16.50c per lb of contained Si, fob Niagara Falls, N. Y.

50% Ferrosilicon: Eastern Zone, contract, carload, lump, bulk 9.3c per lb of contained Si, carload packed 10.9c, ton lot 12.35c, less ton 14.0c; Central, add 0.5c for c.l. and 1.25c for l.c.l.; Western, add 0.7c, for c.l. and 1.8c for l.c.l. Freight allowed. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Eastern Zone, contract, carload, lump, bulk 11.8c per lb of contained Si carload packed 13.1c, ton lot 14.25c, less ton 15.5c. Central, add 0.3c for c.l. and 0.75c for l.c.l.; Western, add 1.05c for c.l. and 5c for l.c.l. Freight allowed. Spot, add 0.3c.

85% Ferrosilicon: Eastern Zone, contract, carload, lump, bulk 13.3c per lb of contained Si, carload packed 14.55c, ton lot 15.55c, less ton 16.7c; Central, add 0.3c for c.l. and 0.7c for l.c.l.; Western, add 1.05c for c.l. and 4.4c for l.c.l. Freight allowed. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.). Add 0.7c to 85% ferrosilicon prices.

90% Ferrosilicon: Eastern Zone, contract, carload, lump, bulk, 15c per lb of contained Si, carload packed 16.2c, ton lot 17.15c, less ton 18.2c; Central, add 0.3c for c.l. and 0.65c for l.c.l.; Western, add 1c for c.l. and 4s for l.c.l. Freight allowed. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.). Add 0.7c to above 90-95% ferrosilicon prices.

Silicon Metal: (Over 97% Si and 1% max. Fe.) Eastern Zone c.l., lump, bulk, regular 17.3c per lb of Si, c.l. packed 18.5c, ton lot 19.4c, less ton 20.4c; Central, add 0.6c for c.l. and 2.25c for l.c.l.; Western, add 1.2c for c.l. and 4c for l.c.l. Add 1c for max. 0.20% calcium grade. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade analyzing over 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe) Contract basis fob Niagara Falls, N. Y., lump per lb cl 6.90c; ton lots packed, 7.40c; 200 to 1999 lb, 8.15c smaller lots 8.65c. Spot up 0.5c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3¾ lb each and containing exactly 2 lb of Cr). Eastern Zone, contract, carload, bulk, 12.5c per lb or briquet, carload packed 13.2c, ton lot 14.0c, less ton 14.9c; Central, add 0.25c for

(*Please turn to Page* 172)

Stockpiling Estimates Increased

Due to advance in prices, present estimate of gross value of all stockpile objective is now nearly $3½ billion. Purchase plans for 1949 to be more aggressive

New York—Since Jan. 1, 1948, the prices of some materials have risen and the present estimate of the gross value of all stockpile objective now is $3,402,997,000, according to a report on stockpiling released recently in Washington by the government. The following tabulation indicates on a dollar value basis the portions of this overall amount on hand and in sight. The report said in part as follows:

The existing stockpiles still are badly out of balance, although the situation has improved in the past six months and is steadily showing further improvement. The present policy of more aggressively pursuing the objectives in the case of scarce materials will result in a decided improvement over the next year.

Progress In Stockpiling

(In Millions Of Dollars)	
Gross delivered value of stockpile objectives	$3,403
Material on Hand.	
From Public Law 117 stockpile	86
From surplus property	424
From Public Law 520 deliveries	87
Total on hand	$ 597
Balance of requirements not on hand	$2,806
Materials in Sight	
Further surplus property	29
Deliveries against present contracts	223
Total in sight	$ 252
Balance to be purchased	$2,554
Unobligated funds available	$ 490
Funds not yet available	$2,064

Stockpile Policies

In general the policy adhered to by the Munitions Board in the administration of the stockpiling function has been to seek to reconcile the national security interest in reserves of essential materials with the national security interest in a prosperous and active economy. Thus, the Board has sought to achieve a maximum rate of stockpile procurement with minimum withdrawal of scarce materials needed by private industry to restore itself to a sound peacetime footing.

An effort has been made toward economic and prudent buying of materials to ensure full return on the people's investment in national security. However, economy must always be subject to considerations of the national security.

The desirability of advancing simultaneously toward all stockpile goals should be clearly recognized. All 67 items on the Group A list are vital import to the United States economy in time of war emergency. It is extremely difficult to assign any priorities of relative importance to the list as the lack of any single item may cause industry to fail in its support of military operations. To emphasize lagging commodities the Munitions Board has established short range goals and does not usually make purchases of items already held in excess of these goals. A cut-off date of June 30, 1949 has been established as the current short range goal. This date marks the end of the third year of operaiton of the stockpile program. It is not planned to include commodities in our current purchase program if the stockpile already contains quantities of such commodities equal to the goals set for accumulation by that date.

Metal Price Averages For August

(Cents per pound)

Electrolytic Copper, del. Conn.	23.230
Lead, St. Louis	19.325
Prime Western Zinc, E. St. Louis	15.000
Straits Tin, New York	103.000
Primary Aluminum Ingots, del.	16.269
Antimony, f.o.b. Laredo, Tex.	35.000
Nickel, f.o.b. refinery	40.000
Silver, New York	73.790

The policy of the Board has been to buy materials for the stockpile at or below current market prices. However, in response to the increased need for certain scarce items to bring the stockpile into balance, it may be necessary to have leeway from rigid adherence to this policy.

Accelerated Accumulation

Presidential and congressional recognition of the urgency imposed by the unsettled international conditions is matched in the Munitions Board's purchase plans for 1949, and is also reflected in a more aggressive policy toward procurement of materials still in short supply.

Copper—Trade interests believe that the Munitions Board's plan to purchase 2500 tons of copper each month through the first half of next year cannot fail to accentuate an already tight supply situation. Prices held unchanged last week.

Lead—The government's stockpiling plans, calling for purchase of 16,000 tons of lead during the third quarter of this year for delivery by June, 1949, are expected to result in a steadily tightening supply situation. The outlook is further darkened by unfavorable labor reports from the producing areas.

Zinc—Although Illinois Zinc Co. announced on Aug. 25 that operations have been resumed at the company's Chicago and Peru, Ill., rolling mills, reports from other midwestern producing areas indicate that it will be several weeks before operations can be returned to normal. In view of the loss in supplies due to labor disturbances, the government's plan to purchase 16,000 short tons during July-September for delivery by June 30, 1949, indicates a continued stringency of zinc metal.

Tin—The 4500 tons which the Munitions Board will acquire for stockpiling is expected to be acquired from the Office of Metals Reserve and is expected to make no noticeable change in present supply-demand relationship.

ECA Grants Include Metals

Washington — Procurement and reimbursement authorizations reported by the Economic Cooperation Administration for the week ended Aug. 25 totaled over $57 million and brought cumulative grant authorizations to $1,245,798,925, with adjustments. Authorizations for the Aug. 25 week included the following: To Austria, rolling mill machinery from the United States, $430,000; to France, lead from Mexico, $832,400, electrolytic copper from Canada, $1,308,000, and tungsten ore from the United States, $333,300; to Greece, tin plate from the United States, $163,200; to Norway, from the United States, bars, $149,863, structural shapes, $386,410, steel plates, $742,943.

Reynolds Advances Aluminum

Louisville, Ky. — Reynolds Metals Co., this city, has advanced the price of aluminum pig to the basis of 16.00c a pound and the price of aluminum ingot to 17.00c a pound, effective as of Aug. 9.

"While the composite base price of other metals is up more than 125 per cent, the new base price for aluminum is still 20 per cent below prewar," said David P. Reynolds, vice president and general sales manager, in discussing the recent price increases in aluminum mill products. "Aluminum is the only basic commodity in our entire economy that today is still priced below prewar figures," he added.

"The recent change in the base price of aluminum pig from 14.00c to 16.00c per pound is the first increase since 1939 . . . and even that rise was postponed long after rapidly increasing labor, packing, shipping and other costs made it inevitable," Mr. Reynolds said.

He explained that this increase in base price also made it necessary to adjust prices of various mill products. Even though increased production and operating costs have a much greater effect on these prices than on ingot prices, the recent price advances have been held down to a composite of around 8 per cent. Only a few extrusion prices were raised, the average rise being around 2-3 per cent. Tubing and pipe prices went up 8-10 per cent on the average, although some were actually lowered. Structurals averaged 6-8 per cent rise, with sheet, rod and bar in the neighborhood of 8-10 per cent.

NONFERROUS METAL PRICES

(Cents per pound, carlots, except as otherwise noted)

Copper: Electrolytic, 23.50c, Conn. Valley; Lake, 23.62½ Conn. Valley.

Brass Ingot: 85-5-5-5 (No. 115) 22.00c; 88-10-2 (No. 215) 31.00c; 80-10-10 (No. 305) 27.25c; No. 1 yellow (No. 405) 17.50c.

Zinc: Prime western 15.00c, brass special 15.25c, intermediate 15.50c, East St. Louis; high grade 16.00c, delivered.

Lead: Common 19.30-19.35c chemical and corroding 19.40c, St. Louis.

Primary Aluminum: 99% plus, ingots 16.00-17.00c, pigs, 15.00-16.00c. Base prices for 10,000 lb and over, fob shipping point, freight allowed.

Secondary Aluminum: Piston alloy (No. 122 type) 24.00-24.75c; No. 12 foundry alloy (No. 2 grade) 23.50-24.00c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 25.25-25.75c; grade 2, 24.50-25.00c; grade 3, 24.00-24.75c; grade 4, 23.50-24.25c. Prices include freight at carload rate up to 75 cents per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over, 20.50c, fob Freeport, Tex.

Tin: Grade A, 99.8% or higher (including Straits) $1.03; grade B, 99.8% or higher, not meeting specifications for grade A, with 0.05% max. arsenic, $1.028; grade C, 99.65-99.79%, incl., $1.024; 99.5-99.649% $1.024, grade F, 98-98.999% $1.015 for tin content. Prices are ex-dock, New York, in 5-ton lots.

Antimony: American 99-99.8% and over but not meeting specifications below, 35.00c; 99.8% and over (arsenic 0.05% max.; other impurities, 0.1% max.) 35.50c, fob Laredo, Tex., for bulk shipments.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 40.00c; 25-lb pigs, 42.50c; shot nom.; "XX" nickel shot, 43.50c; "F" nickel shot or ingots, for addition to cast iron, 40.50c. Prices include import duty.

Mercury: Open market, spot, New York $75-$77 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $20.50 per lb contained Be.

Cadmium: "Regular" straight or flat forms, $1.90, del.; special or patented shapes, $2.

Cobalt: 97-98%, $1.65 per lb for 550 lb (keg); $1.67 per lb for 100 lb (case); $1.72 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York, 74.25c per ounce.

Platinum: $93-$96 per ounce.

Palladium: $24 per troy ounce.

Iridium: $110-$120 per troy ounce.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, fob mill)

Sheet: Copper 37.18; yellow brass 33.75; commercial bronze, 95%, 37.11; 90%, 36.63; red brass, 85%, 35.64; 80%, 35.16; best quality 34.63; nickel silver, 18%, 46.41; phosphor-bronze, grade A, 5%, 56.05.

Rods: Copper, hot rolled 33.03; cold drawn 34.28; yellow brass, free cutting, 33.44; commercial bronze, 95% 36.80; 90% 36.32; red brass, 85% 35.33; 80% 34.85.

Seamless Tubing: Copper 37.22; yellow brass 36.76; commercial bronze 90% 39.29; red brass 85% 38.55; 80% 38.07.

Wire: Yellow brass 34.04; commercial bronze, 95% 37.40; 90% 36.92; red brass, 85% 35.93, 80% 35.45; best quality brass 34.92.

Copper Wire: Bare, soft, fob eastern mills, c.l. 29.42½c, l.c.l. 29.92½-30.05c; weather-proof, fob eastern mills, c.l. 29.60-29.85c, l.c.l. 30.35c; magnet, delivered, c.l. 32.75-33.50c, 15,000 lb or more 33.00-33.75c, l.c.l. 33.50-34.25c.

ALUMINUM

Sheets and Circles: 2c and 3c mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	25.9	...	...
0.135-0.096	12-48	26.4	...	...
0.095-0.077	12-48	26.9	25.0	28.6
0.076-0.068	12-48	27.5	25.2	28.8
0.067-0.061	12-48	27.5	25.2	28.8
0.060-0.048	12-48	27.7	25.4	29.1
0.047-0.043	12-48	28.1	25.6	29.4
0.042-0.038	12-48	28.1	25.6	29.4
0.037-0.030	12-48	28.5	26.0	29.9
0.029-0.024	12-48	28.9	26.3	30.3
0.023-0.019	12-36	29.5	26.7	30.8
0.018-0.017	12-36	30.1	27.3	31.6
0.016-0.015	12-36	30.8	27.9	32.5
0.014	12-24	31.7	28.7	33.6
0.013-0.012	12-24	32.6	29.4	34.5
0.011	12-24	33.6	30.3	35.7
0.010-0.0095	12-24	34.6	31.3	37.0
0.009-0.0085	12-20	35.8	32.4	38.5
0.008-0.0075	12.20	37.1	33.6	40.1
0.007	12-18	38.5	34.9	41.9
0.006	12-18	40.0	36.2	46.0

*** Minimum length, 60 inches. † Maximum diameter, 24 inches.**

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T	17S-T	—Hexagonal— R317-T	17S-T
0.125	45.0	47.0	...	...
0.156-0.203	38.5	40.0	...	...
0.219-0.313	35.5	37.0	...	...
0.344	34.0	36.00	...	...
0.375	33.0	35.5	42.5	43.0
0.406	33.0	35.5	...	...
0.438	33.0	35.5	42.5	43.0
0.469	33.0	35.5	...	...
0.500	33.0	35.5	42.5	43.0
0.531	33.0	35.5	...	...
0.563	33.0	35.5	40.5	40.5
0.594	33.0	34.5	...	...
0.625	33.0	35.5	40.5	40.5
0.656	33.0	35.5	...	...
0.688	33.0	35.5	40.5	40.5
0.750-1.000	32.0	34.5	37.0	38.0
1.063	32.0	34.5	35.5	36.5
1.125-1.500	31.0	33.5	35.5	36.5
1.563	31.0	33.5	...	35.5
1.625	30.0	32.5	34.5	35.5
1.688-2.000	30.0	32.5	...	...
2.125-2.500	29.5	31.5	...	...
2.625-3.375	28.5	30.5	...	...

LEAD

(Prices to jobbers, fob Cleveland, Pittsburgh)

Sheets: Full rolls, 140 sq ft or more, $23.25 per cwt.; add 50c per cwt., 10 sq ft to 140 sq ft; $1.25, less than 10 sq ft; $1, circles and segments. Pipe: Full coils, $22.50 per cwt; cut coils, $22.75. Traps and Bends: List price plus 70%.

ZINC

Sheets, 19.50-20.00c, fob mill, 36.00 lb and over. Ribbon zinc in coils, 18.25c-19.00c, fob mill, 36,000 lb and over. Plates, not over 12-in., 17.25c; over 12-in., 18.25c.

NICKEL

(Base prices, fob mill.)

Sheets, cold-rolled, 60.00c. Strip, cold-rolled 66.00c. Rods and shapes, 56.00c. Plates 58.00c. Seamless tubes, 89.00c.

MONEL

(Base prices, fob mill.)

Sheets, cold-rolled 47.00c; Strip, cold-rolled, 50.00c. Rods and shapes,45.00c. Plates, 46.00c. Seamless tubes, 80.00c. Shot and blocks, 40.00c.

DAILY PRICE RECORD

	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Aug. Avg.	23.230	19.325	15.000	103.00	16.269	35.000	40.000	73.790
Aug. 2-7 ..	21.50–23.50	19.30–19.350	15.000	103.00	15.00–16.000	35.000	40.000	74.625
Aug. 9	21.50–23.50	19.30–19.350	15.000	103.00	16.00–17.000	35.000	40.000	74.625
Aug. 10-12	23.50	19.30–19.350	15.000	103.00	16.00–17.000	35.000	40.000	74.625
Aug. 13-14	23.50	19.30–19.350	15.000	103.00	16.00-17.000	35.000	40.000	72.750
Aug. 16	23.50	19.30–19.350	15.000	103.00	16.00–17.000	35.000	40.000	73.250
Aug. 17	23.50	19.30–19.350	15.000	103.00	16.00–17.000	35.000	40.000	73.750
Aug. 18	23.50	19.30–19.350	15.000	103.00	16.00–17.000	35.000	40.000	73.50
Aug. 19	23.50	19.30–19.350	15.000	103.00	16.00–17.000	35.000	40.000	73.250
Aug. 20-25	23.50	19.30–19.350	15.000	103.00	16.00–17.000	35.000	40.000	72.750
Aug. 26	23.50	19.30–19.350	15.000	103.00	16.00–17.000	35.000	40.000	73.250
Aug. 27-28	23.50	19.30–19.350	15.000	103.00	16.00–17.000	35.000	40.000	73.75
Aug. 30	23.50	19.30–19.350	15.000	103.00	16.00–17.000	35.000	40.000	74.00
Aug. 31	23.50	19.30–19.350	15.000	103.00	16.00–17.000	35.000	40.000	74.250
Sept. 1-2	23.50	19.30–19.350	15.000	103.00	16.00–17.000	35.000	40.000	74.250

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. E. St. Louis; Zinc, prime western, del. St. Louis; Tin, Straits, del. New York; Aluminum, primary ingots, 99%, del.; Antimony, bulk, fob Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery, unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

Plating Materials

Chromic Acid: 99.9%, flake, fob Philadelphia, carloads, 26.00c; 5 tons and over 26.50c; 1 to 5 tons, 27.00c; less than 1 ton, 27.50c.

Copper Anodes: Base, 2000 to 5000 lb; fob shipping point, freight allowed: Flat untrimmed, 33.84c; oval 33.34c; electrodeposited, 31.09c; cast, 30.12c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 46.00c, fob Niagara Falls, N. Y.

Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 16.00c; 1000 to 19,900 lb, 15.00c, fob Niagara Falls, N. Y.

Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 250 lb, 26.25c; over 250 lb, 25.25c, fob Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 56.00c; 10,000 to 30,000 lb, 57.00c; 3000 to 10,000 lb, 58.00c; 500 to 3000 lb, 59.00c; 100 to 500 lb, 61.00c; under 100 lb, 64.00c; fob Cleveland. Add 1 cent for rolled depolarized.

Nickel Chloride: 100-lb kegs, 26.50c; 275-lb, or 500-lb bbl, 24.50c, fob Cleveland.

Tin Anodes: Bar, 1000 lb and over 119.00c; 500 to 999 lb, 119.50c; 200 to 499 lb, 120.00c; less than 200 lb. 121.50c; ball, 1000 lb and over, 121.25c; 500 to 999 lb 121.75c; 200 to 499 lb, 122.25c; less than 200 lb, 123.75c, fob Sewaren, N. J.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers 71.8c; 100 or 300 lb drums only, 100 to 500 lb, 63.6c; 600 to 1900 lb, 61.2c; 2000 to 9900 lb, 59.4c. Prices fob Sewaren, N. J.

Zinc Cyanide: 100-lb drums 39.25c, fob Cleveland; 39.00c, Detroit; 38.00c, fob Philadelphia.

Stannous Sulphate: Less than 2000 lb, in 100 lb kegs, 100.00c, in 400 lb bbl. 99.00c; more than 2000 lb, in 100 lb kegs, 99.00c, in 400 lb bbl, 98.00c.

Scrap Metals

BRASS MILL ALLOWANCES

(Based on 23.50c, Conn., for copper)

Prices in cents per pound for less than 15,000 lb fob shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	21.125	21.125	20.375
Yellow brass	18.000	17.750	17.125
Commercial Bronze			
95%	20.125	19.875	19.375
90%	19.750	19.500	19.000
Red brass			
85%	19.750	19.500	19.000
80%	19.500	19.250	18.750
Best Quality (71-79%)	19.000	18.750	18.250
Muntz Metal	17.250	17.000	16.500
Nickel, silver, 10%...	19.625	19.375	9.813
Phos. bronze, A.	22.625	22.375	21.375
Naval brass	17.750	17.500	17.000
Manganese bronze ...	17.750	17.500	16.875

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, fob shipping point, carload lots)

No. 1 copper 19.50, No. 2 copper 18.50, light copper 17.50, composition red brass 16.50, auto radiators 13.75, heavy yellow brass 11.87½, brass pipe, 13.00.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 20.25-20.50, No. 2 copper 19.25, light copper, 18.25, refinery brass (60% copper), per dry copper content 18.00-18.25.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots or more)

Copper and Brass: Heavy copper and wire No. 1 17.75-18.00, No. 2 16.75-17.00, light copper 15.75-16.00, No. 1 composition red brass 13.75-14.00, No. 1 composition turnings 13.25-13.50, mixed brass turnings 8.00-8.25, new brass clippings 15.00-15.50, No. 1 brass rod turnings 12.00-12.50, light brass 7.50-8.00, heavy yellow brass 9.75-10.00, new brass rod ends 12.50-13.00, auto radiators, unsweated 11.50-12.00 cocks and faucets 11.25-11.75, brass pipe 11.00-11.50.

Lead: Heavy 17.00-17.50, battery plates 11.50, linotype and stereotype 18.00-18.50, electrotype 16.50-17.00, mixed babbitt 15.75-16.25, solder joints, 19.75-20.25.

Zinc: Old zinc 7.75-8.25, new die cast scrap 6.25-6.75, old die cast scrap 4.00-4.50.

Tin: No. 1 pewter 65.00-67.00, block tin pipe 83.00-84.00, No. 1 babbitt 51.00-54.00, siphon tops 50.00-52.00.

Aluminum: Clippings 2S 12.00-12.50, old sheets 10.00-10.50, crankcase 10.00-10.50, borings and turnings 5.50-6.00, pistons, free of struts, 10.00-10.50.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, including broker's commission, delivered at consumer's plant except where noted.

PITTSBURGH

No. 1 Heavy Melt. Steel	$42.50-43.00*
No. 2 Heavy Melt. Steel	42.50-43.00*
No. 1 Busheling	42.50-43.00*
Nos. 1, 2 & 3 Bundles	42.50-43.00
Machine Shop Turnings	37.50-38.00
Mixed Borings, Turnings	38.00-38.50
Short Shovel Turnings.	39.50-40.00
Cast Iron Borings	39.50-40.00
Bar Crops and Plate	49.00-49.50
Low Phos. Steel	49.00-49.50
Heavy Turnings	39.50-40.00

Cast Iron Grades

No. 1 Cupola	65.00-66.00
Machinery Cast	72.00-73.00
Charging Box Cast	59.00-60.00
Heavy Breakable Cast.	57.00-58.00
Malleable	69.00-70.00
Brake Shoe	55.50-56.00
Clean Auto Cast	58.00-59.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	43.50-44.00
R.R. Malleable	75.00-80.00
Axles	55.00-56.00
Rails, Rerolling	58.00-59.00
Rails, Random Lengths	54.00-56.00
Rails, 3 ft and under	61.00-62.00
Rails, 18 in. and under	62.00-63.00
Railroad Specialties	60.00-60.50
Uncut Tires	54.50-55.00
Angles, Splice Bars	53.00-54.00

* Plus applicable freight springboard.

CLEVELAND

No. 1 Heavy Melt. Steel	$42.00-42.50*
No. 2 Heavy Melt. Steel	42.00-42.50*
No. 1 Busheling	42.00-42.50*
Nos. 1 & 2 Bundles	42.00-42.50*
Machine Shop Turnings	37.00-37.50
Mixed Borings, Turnings	36.50-38.50
Short Shovel Turnings.	38.00-38.50
Cast Iron Borings	38.00-38.50
Bar Crops and Plate	47.00-47.50
Punchings & Plate Scrap	47.00-47.50
Heavy Turnings	42.00-43.00
Alloy Free Turnings	40.00-41.00
Cut Structurals	48.50-51.50

Cast Iron Grades

No. 1 Cupola	69.00-71.00
Charging Box Cast	58.00-60.00
Stove Plate	58.00-60.00
Heavy Breakable Cast.	54.00-56.00
Unstripped Motor Blocks	58.00-60.00
Malleable	78.00-80.00
Brake Shoes	52.00-53.00
Clean Auto Cast	68.00-70.00
No. 1 Wheels	58.00-60.00
Burnt Cast	56.00-57.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	43.00-44.00*
R.R. Malleable	78.00-80.00
Rails, Rerolling	60.00-66.00
Rails, Random Lengths	58.00-59.00
Rails, 3 ft and under	63.00-64.00
Cast Steel	56.00-58.00
Railroad Specialties	58.00-59.00
Uncut Tires	55.00-56.00
Angles, Splice Bars	61.00-62.00

* Plus applicable freight springboard.

VALLEY

No. 1 Heavy Melt. Steel	$42.50-43.00*
No. 2 Heavy Melt. Steel	42.50-43.00
No. 1 Bundles	42.50-43.00
Machine Shop Turnings	37.00-39.00
Short Shovel Turnings.	39.00-39.50
Cast Iron Borings	38.50-39.00
Low Phos.	48.50-50.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	43.00-44.00*

* Plus applicable freight springboard.

MANSFIELD

Machine Shop Turnings	$37.50-38.00
Short Shovel Turnings.	39.50-40.00

CINCINNATI

No. 1 Heavy Melt. Steel	$42.00
No. 2 Heavy Melt. Steel	42.00
No. 1 Busheling	42.00
Nos. 1 & 2 Bundles	42.00
Machine Shop Turnings	36.00
Mixed Borings, Turnings	36.00
Short Shovel Turnings.	38.00
Cast Iron Borings	37.00

Cast Iron Grades

No. 1 Cupola Cast	57.00
Charging Box Cast	45.00
Heavy Breakable Cast.	56.00
Stove Plate	50.00
Unstripped Motor Blocks	50.00
Brake Shoes	48.00
Clean Auto Cast	57.00
Drop Broken Cast	65.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	43.00
R.R. Malleable	70.00
Rails, Rerolling	55.00
Rails, Random Lengths	54.00
Rails, 18 in. and under	61.00

DETROIT

(Brokers' buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$37.50-38.00
No. 1 Busheling	37.50-38.00
Nos. 1 & 2 Bundles	37.50-38.00
No. 3 Bundles	37.50-38.00
Machine Shop Turning	31.50-32.00
Mixed Borings, Turnings	31.50-32.00
Short Shovel Turnings.	32.50-33.00
Cast Iron Borings	32.50-33.00
Punchings & Plate Scrap	42.50-43.00

Cast Iron Grades

No. 1 Cupola Cast	53.00-58.00
Heavy Breakable Cast.	47.00-52.00
Clean Auto Cast	53.00-58.00

BUFFALO

No. 1 Heavy Melt. Steel	$47.50-48.50
No. 2 Heavy Melt. Steel	41.75-42.25
No. 1 Busheling	41.75-42.25
No. 1 & 2 Bundles	41.75-42.25
Machine Shop Turnings	36.75-37.25
Mixed Borings, Turnings	36.75-37.25
Cast Iron Borings	37.75-38.25
Short Shovel Turnings.	38.75-39.25
Low Phos.	49.00-50.00

Cast Iron Grades

No. 1 Cupola	69.00-70.00
Mixed Cupola	63.50-64.00
Heavy Breakable Cast.	55.00-57.00
Malleable	70.00-75.00
Clean Auto Cast	62.00-64.00

Railroad Scrap

Rails, 3 ft. and under.	60.00-61.00
Railroad Specialties	55.00-56.00

PHILADELPHIA

No. 1 Heavy Melt. Steel	$45.00-46.00
No. 2 Heavy Melt. Steel	41.50
No. 1 Busheling	41.50
Nos. 1 & 2 Bundles	41.50
No. 3 Bundles	39.50
Machine Shop Turnings	37.50
Mixed Borings, Turnings	37.50
Short Shovel Turnings.	38.50
Bar Crop and Plate	50.00-51.00
Punchings & Plate Scrap	50.00-51.00
Cut Structurals	50.00-51.00
Elec. Furnace Bundles.	47.00-48.00
Heavy Turnings	45.50-46.50
No. 1 Chemical Borings	44.00-45.00

Cast Iron Grades

No. 1 Cupola Cast	63.00-65.00
No. 1 Machinery Cast.	67.00-68.00
Charging Box Cast	62.00-62.50
Heavy Breakable Cast.	62.00-62.50
Unstripped Motor Blocks	59.50
Malleable	76.00-78.00
Clean Auto Cast	64.00-65.00
No. 1 Wheels	68.00-70.00

NEW YORK

(Brokers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$39.00
No. 2 Heavy Melt. Steel	37.00
No. 1 Busheling	37.00
Nos. 1 & 2 Bundles	37.00
No. 3 Bundles	35.00
Machine Shop Turnings	30.50-31.00
Mixed Borings, Turnings	28.50-29.00
Short Shovel Turnings.	32.50-33.00
Punchings & Plate Scrap	42.00-42.50
Cut Structurals	42.00-42.50
Elec. Furnace Bundles.	42.00-42.50

Cast Iron Grades

No. 1 Cupola Cast	57.00-58.00
Charging Box Cast	56.00-57.00
Heavy Breakable	56.00-57.00
Unstripped Motor Blocks	52.50-53.50
Malleable	68.00-69.00

BOSTON

(Fob shipping point)

No. 1 Heavy Melt. Steel	$38.90
No. 2 Heavy Melt. Steel	34.40
No. 1 Bundles	34.40
No. 1 Busheling	34.40
Machine Shop Turnings	29.40
Mixed Borings, Turnings	29.40
Short Shovel Turnings	31.40
Bar Crops and Plate	39.00-40.00
Punchings & Plate Scrap	39.00-40.00
Chemical Borings	36.00-37.00

Cast Iron Grades

No. 1 Cupola Cast	64.00-68.00
Heavy Breakable Cast.	58.00-60.00
Stove Plate	52.00-54.00
Unstripped Motor Blocks	46.00-48.00
Clean Auto Cast	54.00-56.00

CHICAGO

No. 1 Heavy Melt. Steel	$41.50-42.00
No. 2 Heavy Melt. Steel	41.50-42.00
No. 1 Bundles	41.50-42.00
No. 2 Bundles	41.50-42.00
No. 3 Bundles	39.50-40.00
Machine Shop Turnings	36.50-37.00
Mixed Borings, Turnings	36.50-37.00
Short Shovel Turnings.	39.50-40.00
Cast Iron Borings	39.00-39.50
Bar Crops and Plate	47.00-48.00
Punchings	48.00-49.00
Elec. Furnace Bundles.	42.50-43.00
Heavy Turnings	41.00-41.50
Cut Structurals	46.50-47.00

Cast Iron Grades

No. 1 Cupola Cast	71.00-72.00
Clean Auto Cast	71.00-72.00
No. 1 Wheels	64.00-65.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	47.00-48.00
Malleable	80.00-81.00
Rails, Rerolling	64.00-65.00
Rails, Random Lengths	58.00-59.00
Rails, 3 ft and under	61.00-62.00
Rails, 18 in. and under	63.00-64.00
Railroad Specialties	57.00-58.00
Angles, Splice Bars	59.00-60.00

ST. LOUIS

No. 1 Heavy Melt. Steel	$44.00-45.00
No. 2 Heavy Melt. Steel	40.00-41.00
Machine Shop Turnings	35.00-36.00
Short Shovel Turnings	36.50-37.50

Cast Iron Grades (Fob shipping point)

No. 1 Cupola Cast	65.00-67.00
Mixed Cast	56.00-58.00
Heavy Breakable Cast.	59.00-60.00
Brake Shoes	60.00-61.00
Clean Auto Cast	65.00-67.00
Burnt Cast	59.00-60.00

Railroad Scrap

R. R. Malleable	71.00-72.00
Rails, Rerolling	63.00-65.00
Rails, Random Lengths	56.00-59.00
Rails, 3 ft. and under	60.00-61.00
Uncut Tires	51.00-52.00
Angles, Splice Bars	54.00-56.00

BIRMINGHAM

No. 1 Heavy Melt. Steel	$39.50
No. 2 Heavy Melt. Steel	39.50
No. 1 Busheling	39.50
Nos. 1 & 2 Bundles	39.00
No. 3 Bundles	37.00
Long Turnings	24.50
Short Shovel Turnings.	26.00-27.00
Cast Iron Borings	25.00
Bar Crops and Plate	40.00
Cut Structurals	38.50

Cast Iron Grades

No. 1 Cupola Cast	63.00
Stove Plate	60.00-62.00
No. 1 Wheels	59.00-61.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	38.00
R.R. Malleable	nom.
Axles, Steel	50.00
Rails, Rerolling	53.00-55.00
Rails, Random Lengths	45.00-48.00
Rails, 3 ft and under	53.00-55.00
Angles and Splice Bars	52.00-53.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	*$27.50
No. 2 Heavy Melt Steel	*27.50
No. 1 Busheling	*27.50
Nos. 1 & 2 Bundles	*27.50
No. 3 Bundles	*24.50
Machine Shop Turnings	*18.00
Bar Crops and Plate	*27.50
Cast Steel	*27.50
Alloy Free Turnings	*18.00
Cut Structurals	*27.50

Railroad Scrap

No. 1 Heavy Melting	*28.50
Axles	*34.00
Rails, Random Lengths	*29.00

* Fob California shipping point.

SEATTLE

No. 1 Heavy Melt. Steel	$26.00
No. 2 Heavy Melt. Steel	26.00
No. 1 Busheling	26.00
Nos. 1 & 2 Bundles	22.00-23.00
No. 3 Bundles	22.00-23.00
Machine Shop Turnings	19.00-21.00
Mixed Borings, Turnings	19.00-21.00
Punchings & Plate Scrap	26.00-28.00
Cut Structurals	26.00-28.00

Cast Iron Grades

No. 1 Cupola Cast	40.00-42.00
Heavy Breakable Cast.	35.00
Stove Plate	30.00
Unstripped Motor Blocks	32.50
Malleable	40.00
Brake Shoes	35.00
Clean Auto Cast	40.00
No. 1 Wheels	35.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	22.00
Railroad Malleable	30.00
Rails, Random Lengths	21.50
Angles and Splice Bars	23.00

LOS ANGELES

No. 1 Heavy Melt. Steel	$27.50
No. 2 Heavy Melt. Steel	27.50
Nos. 1 & 2 Bundles	27.50
Machine Shop Turnings	16.00
Mixed Borings, Turnings	15.50-16.00
Punchinge & Plate Scrap	28.00
Elec. Furnace Bundles.	28.00

Cast Iron Grades

No. 1 Cupola Cast	35.00-36.00

HAMILTON, ONT.

(Ceiling prices, delivered)

Heavy Melt.	$22.00
No. 1 Bundles	22.00
Mechanical Bundles	20.00
Mixed Steel Scrap	19.00
Mixed Borings, Turnings	17.00
Rails, Remelting	28.00
Rails, Rerolling	26.00
Bushelings	17.00
Bushelings, new factory, prep'd	21.00
Bushelings, new factory, unprep'd	16.00
Short Steel Turnings	17.00

Cast Iron Grades*

No. 1 Cast	42.00-48.00
No. 2 Cast	35.00-37.00

* Removed from price control Aug. 9, 1947; quoted on basis of fob shipping point.

Sheets, Strip . . .

Sheet Prices, Page 152

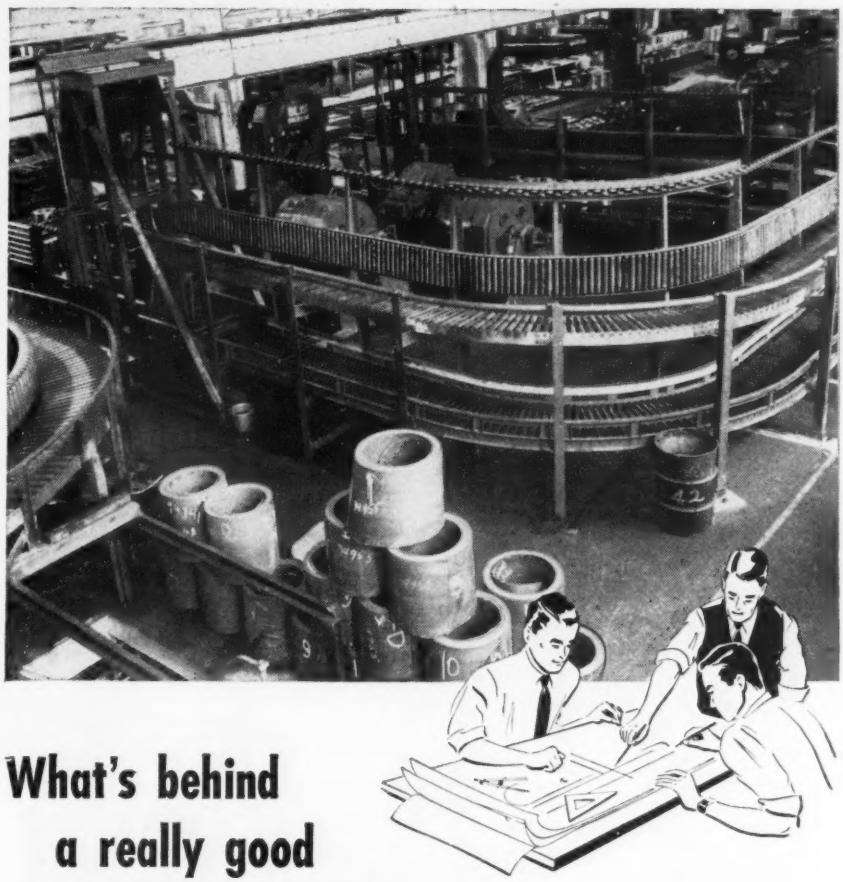
Allegheny Ludlum establishes new price schedule on silicon sheets, effective Sept. 1

Pittsburgh — Allegheny Ludlum Steel Corp. has established the following new price schedule, effective as of Sept. 1, on 24 gage base silicon sheets: Motor, $6.70; dynamo, $7.50; transformer 72 $8.05, T-65 $8.60, and T-58 $9.30 per 100 pounds.

Output of silicon sheets and strip by Carnegie-Illinois Steel Corp. is now concentrated at the Vandegrift works, utilizing a rebuilt 54-inch mill transferred from the Irvin works in addition to hand mills. Nonintegrated interests continue to price cold-rolled carbon strip from $5 to $10 a ton above integrated producers' quotations to offset increased wages and hot-rolled strip prices. Other producers have not followed Jones & Laughlin's action in classifying cold-rolled sheets under 24 inches wide as cold-rolled strip. Similarly, other interests have not adopted Sharon Steel Corp.'s hot-rolled strip dual pricing for 6-inch and narrower and wider than 6 inches. Carryover tonnage and increased commitments for preferred industries under voluntary allocations programs are expected to result in a 5 to 10 per cent reduction in mill allotments during the fourth quarter for consumers not coming within the scope of the programs. However, some cuts in allotments will not be so large as originally planned for October and November because of the possibility that some orders under these programs will not be placed in time to meet "lead time" required. Some producers do not expect all indicated tonnage under the military program to reach formulized order state for October and possibly November production scheduling. There appears to be more widespread interest among various producers to concentrate on cultivating new customers within their logical marketing areas since industrywide pricing at the mill was adopted.

Boston — Confusion in stainless prices is subsiding with more producers meeting competition, although not uniformly with slight variances in cost to consumers. Effective Sept. 1, base quantity by one mill is reduced to 10,000 pounds from 40,000 pounds. Despite adjustments from time to time, price structure for flat-rolled is still mixed; some low carbon strip continues to move under the old basing point system while cost-plus applies on a small volume. More carbon sheet tonnage will be scheduled on a monthly basis during the fourth quarter and less new volume will be available. Carryovers and voluntary program tonnage narrows overall amount of steel for free distribution; small volume beyond October has been scheduled, exception being stainless, electrical grades and some alloys. Electrical sheet allocations are scheduled for the entire period.

New York — Sheet sellers are still in the throes of setting up allotments for next quarter. Some have made no definite commitments to their regular customers beyond October, ex-



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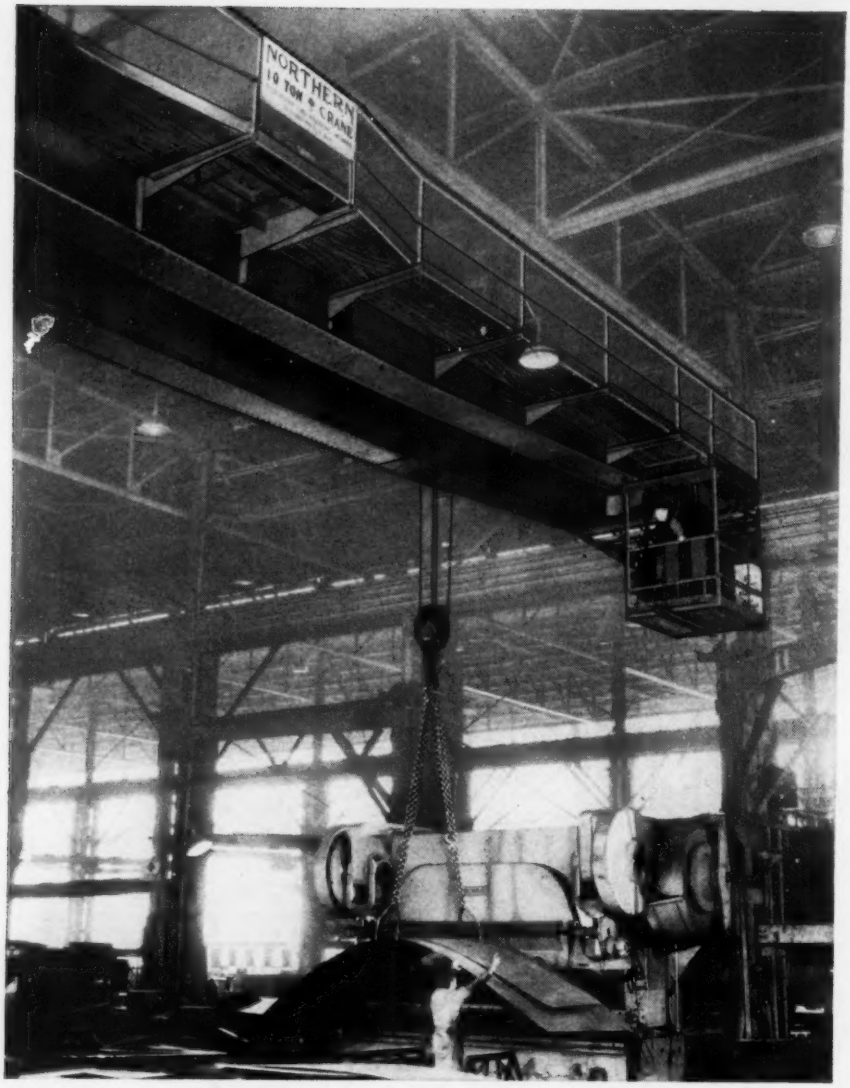

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cept in the case of government sponsored work; and little of this October tonnage represents new specifications. For the most part it is carryover. However, it appears now, with the voluntary allocation program becoming somewhat clarified, that producers, which have not already set up tentative quotas for the entire quarter, will wind up their allotments in the near future. Fears of the rank and file of consumers that fourth quarter allotments of new tonnage will be less than for the third quarter have been confirmed.

Philadelphia — Worst fears of most sheet consumers with regard to fourth quarter supply are being realized. Except for voluntary allocations, few quotas for the entire quarter have been set up. However, to the extent that they have been established, it is clear that new tonnage is going to be substantially less than supplied during the current quarter, due mainly to special allotments. Other factors include the further withdrawal of inland producers from the seaboard market and in certain cases heavier carryovers than at the beginning of this period. This latter is particularly true in one case where slowdowns until recently cut drastically into production for several weeks.

One midwestern mill, whose production of sheet and strip amounts to about 20 per cent of its capacity, will have nothing to offer in this district during the final quarter, except for a limited tonnage under voluntary allotment. Indications are that stringency in sheets and strip will be even more pronounced in the first quarter of next year, when shipments under the European recovery program will be stepped up.

Chicago—Sheet and strip producers feel increasing pressure for deliveries with consumers realizing that the various voluntary allocation programs will remove significant tonnage from free distribution channels during fourth quarter. Some of the pressure appears to come from fear of users that these allocations are going to greatly reduce their quotas. Most mills are not altering quotas for last three months of the year but after they have appraised the full impact of the allocation programs will readjust first quarter quotas as required. Demand for stainless steel has been unsettled since the recent price increase.

Cincinnati—As the sheet mills in this district near completion of fourth quarter schedules, it becomes more apparent that allotments will be trimmed. Regular customers will not receive the tonnage promised in previous quarters this year, even if mills encounter no production snags. Carryover, voluntary allocations and other reasons are given for the cuts. It is believed full effect of developing defense demands will not be encountered this year.

Birmingham—Indications are the conversion from hot to cold-rolled sheets at the Fairfield mill of Tennessee Coal, Iron & Railroad Co. will be completed by late November. This will add, it is estimated, more than 200,000 tons annually to the mill's capacity and, while it is expected to mean some relief from the acute situation prevalent for months here in sheets, it will not be adequate to meet demands.

Steel Bars . . .

Bar Prices, Page 152

New York — This week should witness the rounding out of fourth quarter quotas by some leading producers of hot carbon bars. In the case of one producer, which has taken no action up to this time, quotas are expected to be set up momentarily for the entire 3-month period; in the case of two others which have set up allotments for October only, quotas for November and December are expected to be established. There is still uncertainty as to how much tonnage will have to be set aside finally for voluntary allocation work, but it is the belief of most trade interests that the outlook for the final three months of the year in this regard has become fairly clarified.

Sellers of cold-drawn carbon bars have long since been sold up for the remainder of the year, as they have been willing to take orders further in advance than producers of hot carbon bars. At least two large sellers of cold-drawn carbon bars have refused to accept business beyond the end of this year, but they are the exception. Most cold drawers, even as far back as a few months ago, have been willing to accept attractive business for shipment in the early part of 1949.

Alloy bar deliveries are fairly well extended over the remainder of this year. Some electric furnace capacity is still open, but in the main not much tonnage is available before next year.

Boston — Hot-rolled carbon bar allocations for the fourth quarter are dented by substantial carryover tonnage, with some mills amounting to upwards of one-half production schedules. Volume for open distribution is also reduced by heavier voluntary program requirements and the recent withdrawal of one Ohio producer from this territory. Cold-finished bars are less tight in New England than in most districts due to capacity, although production is hampered by inability to obtain hot-rolled. Military needs are stimulating alloy demand and heat-treated stock. Orderly distribution is also handicapped by failure of purchasing departments to digest procurement procedure involved in certification and other details covered by voluntary distribution. Many are not conversant with methods and rules, depending on mills for interpretation, frequently presenting their problem at the last minute. Heat-treated alloy schedules are overloaded and some tonnage on mill books wanted in November is not yet certified. Sub-contracts are involved and procurement lines are again extending to original placement, frequently to Washington.

Philadelphia—Less affected by voluntary allocations than the flat-rolled products, or even shapes, carbon bars are being rationed out to the regular trade for fourth quarter on a relatively somewhat freer basis than other major products. Quotas will be off somewhat from the current quarter, but not too sharply. Producers, with few important exceptions, have been able to move ahead with their allotments more rapidly than those of other leading products. However, tonnage is still far short of demand and there is still some uncertainty

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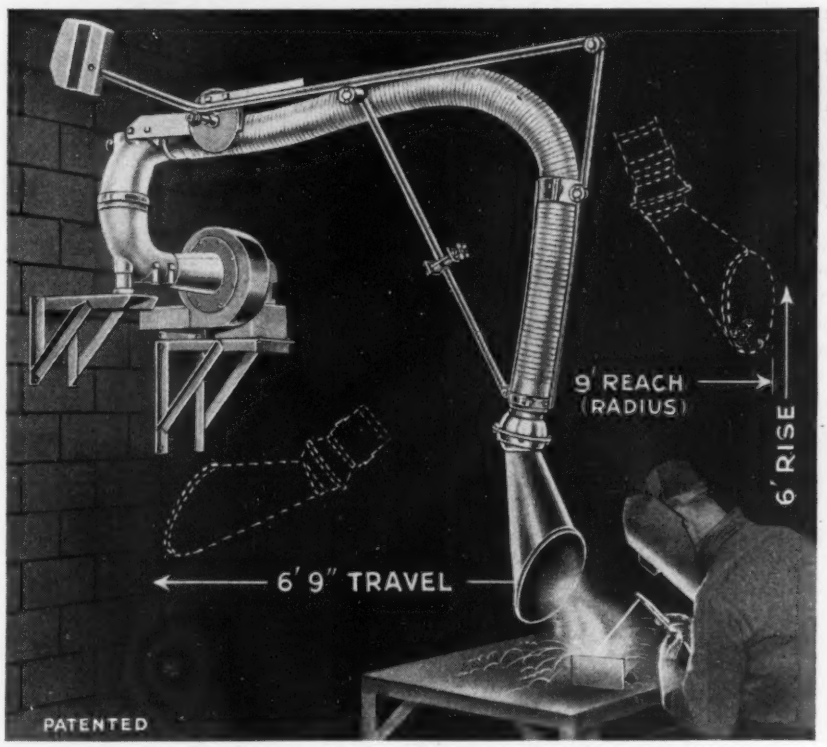

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as to what special obligations will be imposed on sellers before the year is over, a fact that accounts for delay in various instances in setting up quotas for the entire final quarter. Cold drawers have filled their books for the remainder of the year and some have accepted orders for well beyond, especially on attractive specifications. Alloy bar deliveries continue to expand.

Pittsburgh — Cold-finishers have made little headway against order backlogs in recent weeks, reflecting curtailed operations due to unbalanced hot-rolled bar inventories and continued heavy demand. There is some ground for contention order backlogs are augmented by duplicate ordering. Steel supply oulook for fourth quarter is expected to be adversely affected by increasing tonnages scheduled to be channeled for voluntary allocation programs. Most cold-finishers are booked through remainder of year, and are attempting to restrain forward ordering beyond that date. One interest has been distributing cold-finished bars on a mill allotment basis. However, industry generally is not following this practice. Under current mill pricing policy there has been a definite trend among producers of all bar classifications to direct sales efforts among consumers within their logical marketing area.

Chicago — Users of steel bars show increasing concern over growing proportions of the various voluntary allocation programs and fear that their fourth quarter mill quotas will undergo substantial reduction. Because of this, mills are feeling the pressure for shipments, for consumers apparently feel that the quicker they can receive material the more likely they are to get a major portion of their quotas. Alloy bars now are virtually as tight as carbon, an influence attributed partially to military requirements. Forgers are reporting a heavy volume of business, some stating their backlogs are the largest in history. Under these conditions, f.o.b. mill prices are not influencing the distribution pattern as they would under balance supply conditions.

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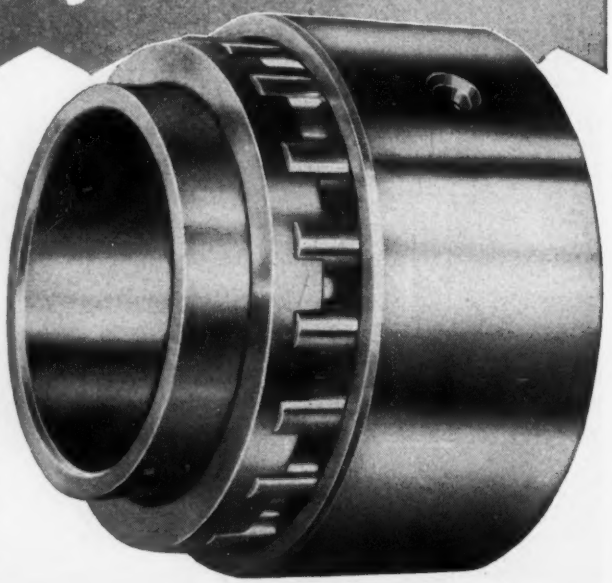

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Wire . . .

Wire Prices, Page 153

Boston — Wire rod supply shows some improvement, but lacks balance. Demand for finished wire holds at high levels with a few products excepted. Mills are scheduling for November production in more instances and selective selling is forced on some in ratio to semifinished steel supplies.

Screw producers are drawing some wire from rods, but depend on finished wire substantially. Revisions in prices and basing methods have opened larger area in southern New England, notably for eastern Pennsylvania mills, the latter having a price advantage or at least being competitive on various products beyond New Haven and into Hartford, Conn.

Pittsburgh — Other producers soon are expected to advance galvanizing extras on nails in line with the 25 and 30 cents per 100 pound increase recently put into effect by Jones & Laughlin Steel Corp. and American Steel & Wire Co., respectively. It was indicated that in the tumbler and galvanizing operation an average of 10 pounds of zinc is used to 100 pounds of nails. American Steel & Wire also increased the electrogalvanizing extra $1 to $6 per 100 pounds. Upward price adjustment is expected momentarily on galvanized wire and fencing.

Chicago — Although demand for a few merchant wire products is declining, stocks are virtually nonexistent and production is unable to keep pace. Requirements for bale ties and wire are down considerably from the two previous years, and a similar situation applies to poultry netting and utility fabric. Shortage of nails is acute and there is little likelihood that improvement can be expected in the foreseeable future. Dealer and jobber stocks of barbed wire, fence, fence posts, nails and other merchant lines are low and unbalanced. Bumper corn crops in the Middle West are increasing pressure for mesh for construction of cribs.

Birmingham—Production schedules in wire products are generally full, in most instances at virtual capacity. But the flow of wire products remains less than the never ending quest. While some improvement is noted in nails, the wire fencing situation is still acute. Cold weather is expected to bring the first real relief.

Structural Shapes . . .

Structural Shape Prices, Page 153

New York — While structural fabricators report continued heavy backlogs, with shops generally now unable to promise shipments before the end of this year, higher costs are resulting in the deferment of work in various instances. Two sizable apartment houses here have recently been postponed indefinitely for this reason, among several smaller projects. Fabricators point out that this tendency is more noticeable now than at any time since prices were advanced a few weeks ago. At first, there was a certain impetus, due to plans being so far along, which made it difficult to discern any particularly adverse effect of higher prices.

In certain instances, where construction has been held up, work has not been withdrawn completely. A case in point is a section of the St. George terminal project in Staten Island, involving 6000 tons and on which bids have just been rejected. The project likely will be brought up again, but on a more modified and less expensive scale. But despite the dampening effect of higher costs on some projects, considerable work is still active.

Structural fabricators lost out on Public School No. 115, Queens, to reinforce concrete builders—lost out by $8000 on a $1,250,000 job. Interestingly, the American Institute of Steel Construction, with the approval of the city, drew up plans for this school involving the use of bar joists and Vermiculite plaster. However, the Board of Education did not make this type of construction a mandatory alternate and that combined with the fact that the contractors did not have ample time to prepare estimates resulted in no bids on this alternate being submitted.

Boston — While new inquiry for private construction is gradually slackening, with few projects held back by high costs, fabricating shops have substantial backlogs and are concerned as to plain material supply to meet commitments. They are pleading for more fourth quarter tonnage, but will get less, although one producer has not scheduled beyond October. Probably the leanest month in the final quarter will be December when more tonnage will be earmarked for program distribution. Considerable ratio of small-lot contracts on shop books was taken on delivery basis and in some instances scheduled dates will not be met.

Philadelphia — Although structural demand is lagging, district fabricators are booked up over the remainder of the year, with some out of the market for five months. Several fair sized jobs are pending. Leading shape producers are expected to round out fourth quarter consumer quotas by the end of this week. In fact, one large interest has already set up allotments for the first two months of that period, another for only one month.

Seattle — Sizable backlogs are reported by fabricators whose operations are about normal in spite of difficulty in obtaining steel. Small jobs predominate as management is unwilling to commit itself beyond current inventories.

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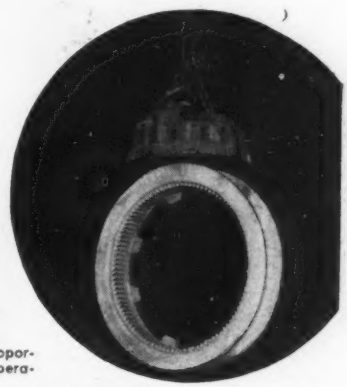

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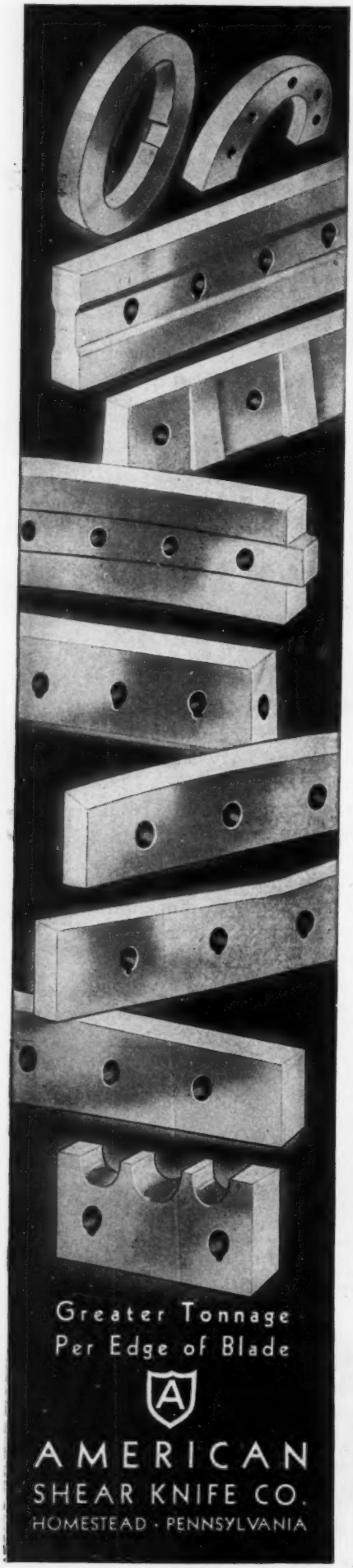


Plates . . .

Plate Prices, Page 153

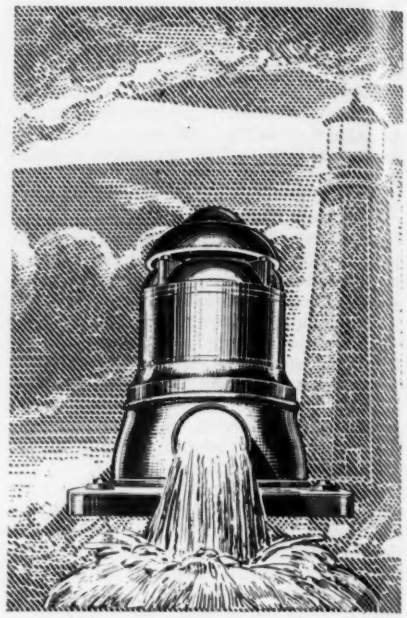
New York — Tank fabricators report they are unable to make any headway on backlogs. They are still handicapped by lack of an adequate tonnage of plates, but there are other factors, including continued high-pressure demand and inability to obtain an adequate number of draftsmen.

Plate producers confirm statements as to ther inability to supply tank fabricators tonnage in adequate amount and declare they are falling short in meeting requirements of a number of different industries. Most producers have now set up quotas for fourth quarter, although one leading eastern seller had not announced quotas other than for voluntary allocation work up to the time this issue went to press. Considerable tonnage to be produced by this interest is being earmarked for the requirements of its own ship yards.

Boston — If volume of plates earmarked for voluntary distribution continues to increase at the current rate, little tonnage will remain for fabricators without program contracts. At least three additional programs are under consideration, two of which, refinery tanks and mining equipment, will draw heavily on plates. This product is especially in demand for allocated distribution, starting with freight car construction and steadily expanding. At least one-third of output is included with some mills and in other instances a higher slice is taken from production. Capacity for plates is not what it was during the war when thousands of tons were rolled on sheet mills, now converted to lighter flat-rolled products. Pipe line tonnage is heavy and fourth quarter quotas, delayed pending program allocations, are drastically reduced to the average user.

Philadelphia—Variance in mill extras has added to the confusion of plate buyers in figuring costs. Some producers have recently set up new gage extras, while others have not. Same situation applies to width extras and burning extras, and at least three mills in the East, although not all, have set up new quantity extras on flanged heads. This, in addition to variances in mill base prices and the general shift away from the basing point system of pricing, has greatly complicated buying procedure.

Further, fourth-quarter quotas are being set up slowly. One eastern producer has not as yet announced allocations for any part of the period, except where preference programs are involved under government sponsorship. One other large interest, up to time this issue went to press, had established no allotments beyond October for its general run of customers. However, while uncertainty still exists as to how much more in the way of voluntary allocations the mills will be called upon to handle before the year is over, the situation is clarifying to a considerable degree, with the probability that shortly most all plate producers will have at least tentative schedules arranged for the remainder of the year. Some, of course, already have. With the development of allocation programs,



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some glaring cases of long hauling are beginning to shape up. For instance, one eastern seaboard mill is being scheduled to supply plates for certain fabricators as far west as Kansas.

Birmingham—Plate users are casting about, as usual, for whatever source of supply they can unearth as requirements here continue greatly in excess of supplies. Warehouse stocks of plates, are wholly inadequate to meet more than a fraction of the requests, but regular plate users in fabrication work on large scale are generally experiencing a somewhat better supply situation. Lighter gages are said to be especially in demand.

Seattle — Increasing shortage of plates is affecting fabricating operations, consequently bidding is confined to small jobs. No large projects are up for bids at the moment and plant managers report operations close to normal on jobs involving small tonnage. Standard Oil Co. of California announces proposed $2 million expansion of oil storage facilities in the Seattle area, new tanks with capacity of 600,000 barrels to be erected at Point Wells. Construction is expected to begin in December. Tonnages are unstated.

Tubular Goods . . .

Tubular Goods Prices, Page 153

New York — Leading merchant pipe producers, with only a few exceptions, are booked up tightly over the remainder of the year. Where they are not booked up, it is because of their refusal to set up quotas for more than one month at a time. For instance, one large seller has only just set up quotas for November and may not take action on the final month of the year for another 30 days. Also, sellers generally have not entered orders for merchant pipe for shipment after the end of the year, although freely admitting that when the time comes they will probably have a substantial carryover. Producers also are tightly booked up over the remainder of this year on tubular lines.

Possibility of voluntary allotments being set up on limited tonnages for public utilities and the petroleum industry may result in some shift in fourth quarter pipe quotas, some producers believe.

Boston — Most distributors are marking up merchant steel pipe at the highest delivered price, regardless of the mill supply point. In effect, this means the Sparrows Point base and freight, resulting in a delivered price $1.40 higher than that from Pittsburgh and Lorain mills. The spread was $1.80 a ton higher, but the recent 40-cent per ton increase in freight from Pittsburgh reduces the margin. One mill, as indicated three weeks ago, has dropped consigned stock selling policy, but most of the others have not followed at this time. There is some reshuffling of pipe accounts in the East and some distributors in the northern tier have been advised to seek new sources.

Pittsburgh — National Tube Co. has tied the price of galvanized pipe to that of zinc. National raised its price $6 a ton, or 3-point lower dis-

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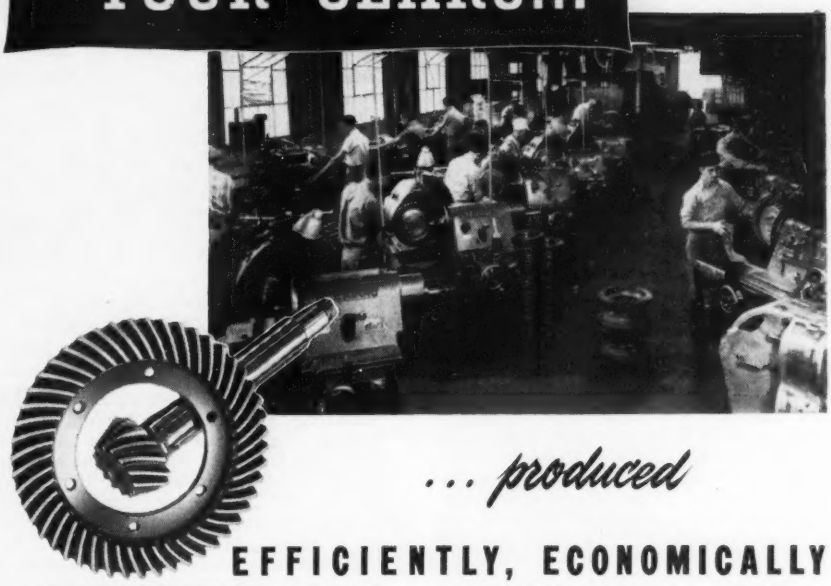

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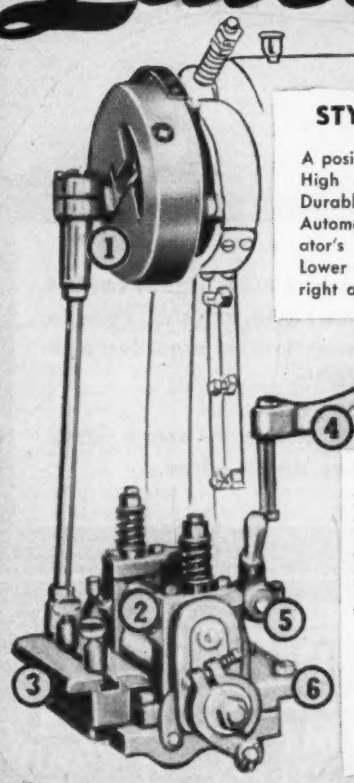

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count, on 3/8-inch and larger, $5 on 1/4-inch and $3 on 1/8-inch to reflect 3-cent per pound increase in zinc short time ago. All other pipe producers have similarly raised galvanized pipe prices, although most have not openly announced their intention of basing galvanized pipe quotations on future fluctuations in zinc prices. For every 1-cent advance or decline in zinc prices, National Tube Co. will in the future adjust its discounts $2 per ton.

A. M. Byers Co. has advanced butt and lap weld galvanized wrought iron pipe $8 a ton. Producers also have advanced conduit as follows: 1/2-3/4-inch, $6; 1/2-inch, $5; and 2-1/2-inch and larger, $4.

With the purchase of Consolidated Western Steel Corp., formerly Consolidated Steel Corp., U. S. Steel Corp. gets into the business of making 30-inch and larger electric weld pipe. During the war National Tube Co. produced 24-inch electric weld pipe at its Christy Park Works, McKeesport, Pa., but this operation since has been discontinued. Consolidated Western has been producing 30-inch o.d. up to 36-inch for a trans-Arabian line. However, shipment of pipe for this line (which is expected to involve over 200,000 tons) has been temporarily stopped.

Republic Steel Corp. has notified its jobbers that as of Sept. 1, shipment of pipe to them would no longer be on a consignment basis. It is contended that under current market conditions of excessive demand and rapid stock turnover, the distribution of pipe on a consignment basis is no longer necessary, while direct sale to jobbers eliminates unnecessary paper work in matter of keeping records. This action is not expected to create particular hardship for most jobbers as relatively little capital will be tied up in inventory as long as tight supply conditions prevail. Other pipe producers are reported considering taking similar action.

Seattle — Cast iron pipe agencies find little comfort in present conditions, practically all bid calls specifying alternatives which offer prompter delivery than cast iron pipe mills can meet. Were materials available, much cast iron would be purchased in this area.

Rails, Cars . . .

Track Material Prices, Page 153

New York — Higher cost of steel is resulting in lighter demand for freight cars, car builders declare. The most recent indication of this trend is the withdrawal by the Reading Co. of its inquiry for 1000 seventy-ton hopper cars. Inquiry generally is light, with a list of 500 box cars for the New York, Chicago & St. Louis, outstanding. Locomotive demand is featured by plans of the Central of New Jersey to purchase fourteen 1500-horsepower Diesel-electric locomotives. Demand for trolley coaches is said to have eased considerably, not only because of higher prices, but also because of extended delivery promises due primarily to delay in obtaining electric power equipment.

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Reinforcing Bars . . .

Reinforcing Bar Prices, Page 152

Seattle — Rolling mills are fully booked on reinforcing bars to the end of 1948 and are in position to give preference to regular customers and to choice tonnages. One plant is booking into the first quarter but will not commit itself as to current prices beyond Dec. 31. There is continued strong pressure for small tonnages, many of which producers have to decline.

Pig Iron . . .

Pig Iron Prices, Page 154

New York — District pig iron melt this month is likely to improve with the prospect of more seasonable weather and a somewhat better supply of pig iron. During the recent heat wave, foundry operations dropped sharply. Last week, with cooler weather, there was some improvement and with the passing of the Labor Day holiday weekend, it is expected that the melt will be maintained on a still higher plane, especially with raw material shipments being stepped up.

The Swedeland, Pa., merchant furnace is expected to step up its quotas by about 50 per cent over last month, now that it is back in full production after a shutdown for repairs. In the case of two other producers of pig iron, quotas are expected to be stepped up at least slightly. Moreover, shipments of Continental iron are expected to be on a larger scale over the next several weeks. This iron appears to be ranging anywhere from $80 to $100 seaboard, plus handling charges, making it highly expensive, especially where inland freight also is involved. However, tonnage is badly needed and even the small foundries are willing to pay the higher prices, particularly if it means that a carload or so will keep their operations from closing down.

Boston—While slightly more silvery pig iron will be shipped to New England this month, outlook for other grades of domestic foundry iron is not promising. Some shops will manage to remain in operation with the arrival of additional foreign iron on which prices range from $85 to $95 a ton, dock. With clean cupola cast bringing up to $68 a ton, foundry raw material costs are at record levels. However, to hold casting rejections down with current high scrap melts, use of high-cost iron is warranted in some instances. Threatened loss of basic from Republic Steel Corp.'s furnaces is most serious for two district steelworks while Mystic suspension hits the foundry trade the hardest. Foundries have been getting little Republic iron in this area.

Philadelphia — While there is an increasing volume of imported tonnage, it is still light and district consumers report continued difficulty in getting anywhere near an adequate supply of pig iron. Indications are that receipts in general, both from foreign and domestic producers, will be heavier this month, but that the stringency will continue acute. Heavier allotments to pipe makers, under

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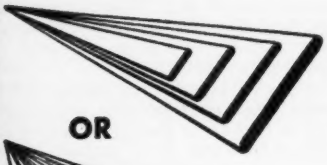
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government-sponsored voluntary control, will contribute to difficulty of the rank and file of consumers in obtaining adequate tonnage.

Most foundries are in fairly comfortable position on coke, although this situation will tighten this fall. Present fairly satisfactory inventory position is ascribed mainly to the fact that one leading district producer had its merchant pig iron furnace down throughout the greater part of the summer for repairs, with its usual coke requirements being diverted to foundries. However, this furnace is now back in full operation and this producing interest is continuing with its oven repair program which will result in a squeeze in supply within the next several weeks.

Buffalo—More than 30 foundries in this area are making a concerted move to avoid future threats to iron supplies, similar to the Republic Steel situation involving WAA's Cleveland furnace.

There is talk of combining forces to build a new $4 million blast furnace which would be cooperatively owned and operated.

Pittsburgh—Pig iron scarcity remains the major factor retarding foundry production schedules, although the shortage of good quality coke and cast scrap are contributing factors. Similarly, output of iron is about 10 per cent below rated furnace capacity, due largely to poor quality coke. Overall supply of merchant iron represents less than 70 per cent of foundries' needs.

Chicago — Foundrymen in these parts are breathing easier now that the Kaiser-Frazer and Republic Steel Corp. agreement assures that the Cleveland DPC blast furnace will continue to suuply foundry iron for at least the next eight months. Overall demand for iron is so great and so far short of supply that the distribution pattern is sensitive to even small influences. Melting operations are geared entirely to iron receipts and curtailments are frequent. Of the district's 43 blast furnaces, only 38 are operating. Little change in the picture is foreseen until around Oct. 1 when Youngstown Sheet & Tube Co. expects to light its new 1400-ton stack at Indiana Harbor, Ind.

Cincinnati — Key to the foundry melt in this district is the result of negotiations for pig iron from Republic Steel Corp., in turn hinging on pacts with Kaiser-Frazer in respect to the Cleveland furnace. Nearly 50 foundries in this area listed Republic as source of part or all of pig iron supplies. A large proportion of the southern iron supply was jeopardized by a walkout in Birmingham.

Birmingham—Pig iron requirements remain far and away greater than ability to meet them from local sources. Movement of iron into the district is measured only by ability to get iron from other sections. The strike at the coke oven of Sloss-Sheffield Steel & Iron Co. was settled Aug. 30.

Seattle — The pig iron situation promises no immediate relief and foundries are doing their best with the limited supplies available, using meanwhile larger tonnages of cast iron scrap. Columbia Steel Co. reports its Utah plant is still down for seasonal repairs.

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Scrap . . .

Scrap Prices, Page 158

Washington — Iron and steel scrap dealers will meet with Commerce Department officials Sept. 8 to discuss a plan to bring German scrap into this country. Purpose of the meeting is to get the views of the industry on a plan to set up a private corporation as exclusive agent in Germany for the purchase of scrap. Some 3600 scrap dealers have been invited to the meeting. If the plan is approved, the Office of Industry Co-operation will organize the purchasing corporation under its authority to promote voluntary plans for the allocation of scarce materials.

Pittsburgh — Steel producers indicate they would be willing to purchase prepared German scrap for $26 per ton, which would make the delivered price around $50, Pittsburgh. It is believed such scrap will be necessary to supplement inventories for use during the winter months. Carnegie-Illinois Steel Corp. recently purchased upward to 200,000 tons of German prepared scrap from Scrap Iron & Steel Import Corp., New York. Most of this scrap is scheduled to be delivered to mills here by the yearend. Completion of deliveries is expected by April. Not all brokers and dealers favor the suggested central purchasing and selling agency for handling European scrap because of price and allocation controls to be established by the War and Commerce departments, respectively.

Philadelphia — Foreign scrap is coming in more freely along the eastern seaboard, but is expected to have little, if any, depressing effect on the steel scrap price structure this year.

Prices on open hearth scrap and machine shop turnings and mixed borings and turnings are unchanged, although prices are slightly higher on some grades of low phos. Cut structurals are now higher at $50 to $51, delivered, electric furnace bundles at $47 to $48 and heavy turnings at $45.50 to $46.50. No. 1 chemical borings are now $44 to $45. Charging box cast is higher at $62 to $62.50, with heavy breakable cast also quoted in this range.

Two cargoes of steel scrap, totaling about 20,000 tons, are being unloaded here. It will be subject to preparation and will be divided among three district mills. One cargo is from Europe and the other from a Pacific point.

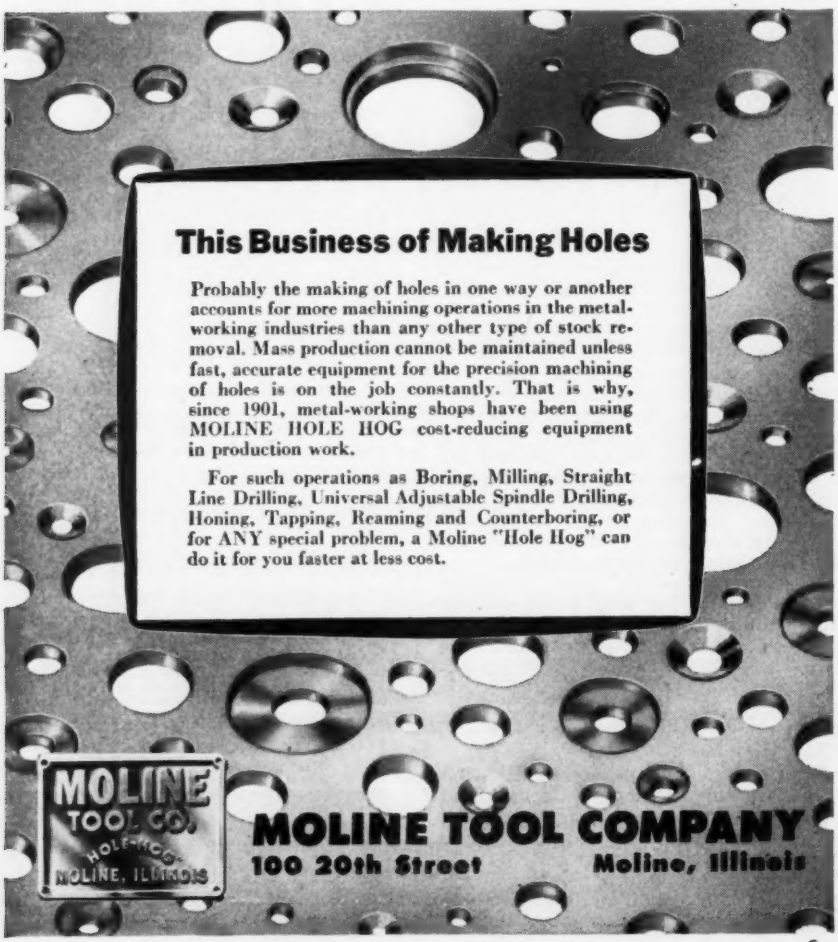
Recent change in interstate freight rates will not affect more than 5 to 7 per cent of the scrap tonnage hauled in this country, as it will affect only the long hauls, possibly amounting to about $10 and over. Maximum advances on scrap under the new schedules amount to $5.20 on the net ton basis and $5.58 on the gross ton basis. Previously, the maximum was $4.80 in both instances.

New York — Scrap brokers' buying prices are unchanged, with substantial tonnages of steel scrap moving. There is demand for all available. Certain of the cast grades are easier in tone. A cargo of 9000 tons of European steel scrap was scheduled to arrive over the past weekend for the account of the leading eastern consumer. A portion of this scrap is scheduled to go to Lackawanna, N. Y., with the remainder for Bethlehem, Pa. Similar tonnages for this consumer are expected to arrive here each week over the remainder of the month.

Buffalo — Receipts of scrap from European battlefields are helping leading mill consumers to build up reserve stocks for the winter months. One fleet of barges loaded with 2500 tons of war scrap has arrived, a second fleet with 3500 tons of war scrap is en route, while a third fleet that will carry 3000 tons is being loaded on the seaboard. It is hoped that the imported material will be sufficient to enable mills to accumulate ample stockpiles. Up to this point, there has been considerable apprehension over the failure of domestic supplies to expand sufficiently to meet stockpiling requirements.

Steady strength ruled the price list during the week. An additional 50 cents a ton was added to the outside figure of the range on No. 1 heavy melting when sales were reported as high as $48.50 a ton. No new business of any consequence was reported for No. 2 material as dealers continued to ship against orders placed at $42.25 a ton. Pronounced strength again dominated trading in low phos with prices jumping about $2 a ton to a range of $49 to $50.

Boston—Cast iron scrap prices are strong, higher bids being made by smaller consumers with low inventories. As high as $68 delivered and even higher has been made for clean cupola cast. Heavy breakable is also stronger. Heavy melting steel scrap is moving at the formula, but there are frequent transactions where $2.50 more per ton is paid. Low phos steel scrap has moved above $40, shipping point, and light iron brings around $28.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Warehouse . . .

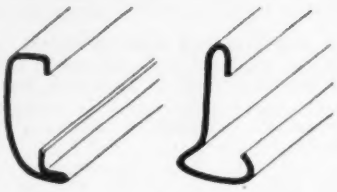
Warehouse Prices, Page 155

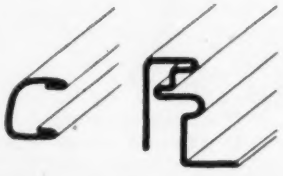
Boston—Steel from warehouses is generally distributed on an f.o.b. basis with the consumer paying delivery charges. Few definite warehouse quotas have been assigned for the fourth quarter on any carbon steel product, but mill tonnage offered indicates sharp reductions in the overall volume for distributors. Hot-rolled carbon sheets are not scheduled for warehouses in some instances and only over-runs of cold-rolled and galvanized sheets are available.

Philadelphia — August warehouse sales increased, and one leading distributor experienced a stepping up of 10 per cent in tonnage volume alone, for the best month so far this year. Dollar volume for the trade in general advanced more than tonnage volume, due to the increase in prices. One representative jobber here is now selling on an f.o.b. warehouse basis only, having discarded the city and country price designations.

Chicago — Quoting of prices on a country and city basis continues in

ROLLS





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vogue here. The country price is f.o.b. warehouse and is the figure charged when the customer picks up his tonnage at that point. The city price delivered within the normal warehouse delivery district—in the case of the Chicago area, the delivery fee is a flat $3 a ton. This fee applies in case of delivery to a freight station or dock for shipment to a destination outside the district. Each week finds warehouses operating on continuously decreasing inventories and conviction is universal that the situation will not be otherwise for months to come.

St. Louis — Steel warehouse inventories continue their slow decline of the last several months with prospects they may get worse in the fourth quarter. Mill receipts were cut back an average of 20 per cent in the third quarter and warehouses anticipate a somewhat greater trimming in the fourth. A general complaint is that they cannot get definite word from their suppliers on what tonnage to expect.

Seattle — Wholesale jobbers report turnover continues large in spite of higher prices, although in some lines interest appears waning. The average buyer inquires first about items available, price being a secondary consideration. Supply of critical items has not eased and the demand for them continues unbroken. Southern California interests are advertising here offering immediate delivery from Los Angeles warehouse of 26-gage, 26½ x 96, 28-gage, 28 x 96 galvanized steel sheets and 26-gage corrugated galvanized sheets 27½ x 93 inches, also hot-rolled and cold-rolled steel sheets standard sizes and gages, subject to prior sale. Established houses report they are not interested in these outside offers.

Refractories . . .

Refractories Prices, Page 154

Pittsburgh — Ladle brick producers in Pennsylvania, Ohio, West Virginia and Illinois have established $5 higher price for dry press brick to $55; wire cut, $53. No let-up in demand is noted in the various refractory brick items, with most sellers reporting further extension of order backlogs in recent weeks.

Canada . . .

Toronto, Ont.—Production of primary iron and steel shapes in Canada in May amounted to 318,416 net tons, against 318,594 tons for April and 282,416 tons in May, 1947. May production included 303,298 tons of carbon and 15,118 tons of alloy steel shapes. Figures on production for May include 85,676 tons of shapes shipped to producers' own plants or plants within the industry for further processing.

During May, shipments for sale of primary iron and steel shapes amounted to 229,672 net tons of which 215,728 tons were carbon and 13,944 tons alloy steel shapes; for April shipments for sale amounted to 220,508 net tons and included 206,875 tons of carbon and 13,633 tons of alloy steel shapes, and for May, 1947, shipments for sale amounted to 202,681 tons, including 191,562 tons of

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carbon and 11,119 tons of alloy steel shapes. Figures showing iron and steel shapes for sale do not include deliveries to plants within the industry for further processing.

Shipments for sale in May included 13,324 tons of semifinished shapes; 12,643 tons of structurals; 22,400 tons of plates; 32,412 tons of rails; 10,391 tons of tie plates and track materials; 54,570 tons of hot-rolled bars; 11,343 tons of pipe and tubes; 13,879 tons of wire rods; 18,935 tons of black sheets; 8237 tons of galvanized sheets; 8866 tons of castings; 4783 tons of miscellaneous hot rolled products and 17,889 tons of all other products.

Of the shipments for sale in May, 52,203 tons went directly to railways and railway car shops; 11,244 tons to pressing, forming and stamping plants; 20,026 tons to merchant trade products; 25,732 tons to building construction; 17,026 tons to the containers industry; 9456 tons to agricultural implements and equipment; 12,555 tons to the automotive industry; 11,886 tons to machinery plants; 5251 tons to shipbuilding; 6815 tons to mining, lumbering, etc. and 1870 tons to miscellaneous industries. Wholesalers and warehousing accounted for 25,019 tons and exports for 30,580 tons.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2200 tons, power house extension, Wisconsin Electric Power Co., Port Washington, Wis., to Worden-Allen Co., Milwaukee.

740 tons, public School No. 14, Staten Island, New York, to Lehigh Structural Steel Co., Allentown, Pa.

530 tons, building, Richmond Newspapers Inc., Richmond, Va., to Lehigh Structural Steel Co., Allentown, Pa.

458 tons, stop logs, Spec. 2286, Odair, Wash., for U. S. Bureau of Reclamation, to American Bridge Co., Pittsburgh.

388 tons, bridge, Sec. 2929, Winamac, Ind., for State Highway Division, to Bethlehem Steel Co.

270 tons, bridge, Sec. 3016, Indianapolis, for State Highway Division, to Bethlehem Steel Co.

230 tons, addition, New York University, New York, to American Bridge Co., Pittsburgh.

125 tons, Montana state bridges, to Bethlehem Pacific Coast Steel Corp., Seattle.

125 tons, music building, University of Washington, Seattle, to Pacific Car & Foundry Co., Seattle; Strand & Sons, Seattle, general contract.

125 tons, galvanized steel towers for Grand Coulee switchyard, to American Bridge Co., Pittsburgh, low, $58,535.

100 tons, small buildings, The Texas Co., Thorofar, N. J., to Bethlehem Steel Co.

STRUCTURAL STEEL PENDING

6000 tons, one section of the Municipal ferry terminal, St. George, Staten Island, New York, bids rejected; modified plans to be submitted for bids later.

808 tons, state bridge, Meadville, Pa., bids Sept. 17; also 190 tons of reinforcing bars.

700 tons, Public School No. 115, Queens, New York; project to be erected of reinforced concrete.

500 tons, state bridge, Port Byron, N. Y.; bids Sept. 15.

500 tons, seven miscellaneous New York state highway bridges; bids closed Sept. 1.

433 tons, state bridge, Delaware county, Pennsylvania; bids Sept. 10; also 118 tons of reinforcing bars.

400 tons, three Montana state bridges; bids to Helena, Sept. 16.

200 tons, high school, Kirkland, Wash.; general contract to Wick & Dahlgren, Seattle, low, $883,785.

Unstated, power plant at Fairbanks, Alaska; bids to Alaska Railroad, Anchorage, Sept. 7.

Unstated, 120-foot steel truss span, highway project, Marion county, Oregon; bids to Portland, Sept. 13.

REINFORCING BARS . . .

REINFORCING BARS PLACED

368 tons, pumping station, Madison, Wis., to Bethlehem Steel Co.; LaCrosse Dredging Corp., Chicago, contractor.

280 tons, Public School No. 115, Queens, New York, awarded through Lourence J. Rice, Forest Hills, Queens, to Carroll-McCreary & Co, Inc., Brooklyn, N. Y.

200 tons, museum, State of Illinois, Springfield, Ill., to Laclede Steel Co., St. Louis; Lloyds Builders Inc., Chicago, contractor.

200 tons, steam power station, Unit No. 3, Alma, Wis., to Bethlehem Steel Co.; LaCrosse Dredging Corp., Chicago, contractor.

160 tons, school, St. John the Baptist, Whiting, Ind., to Olney J. Dean Steel Co., Chicago; Roy C. Clark Inc., East Chicago, Ind., contractor.

100 tons, public school building, Gary, Ind., to Carnegie-Illinois Steel Corp., Chicago; Joseph J. Duffy Co., Chicago, contractor.

100 tons, high school, Kirkland, Wash., to Bethlehem Pacific Coast Steel Corp., Seattle; Wick & Dahlgren, Seattle, general contract.

REINFORCING BARS PENDING

5000 tons, Columbia Basin pumphouse; bids in to Bureau of Reclamation, Denver, Sept. 1.

200 tons, power house and diesel engine shop for Alaska Railroad at Fairbanks; bids pending.

190 tons, state bridge, Meadville, Pa.; also 808 tons of structural steel; bids Sept. 17.

118 tons, state bridge, Delaware county, Pennsylvania; also 433 tons of structural steel; bids Sept. 10.

PLATES . . .

PLATES PENDING

Unstated, $2 million oil storage expansion at Point Wells, near Seattle; planned by Standard Oil Co. of California, involving increased storage capacity of 600,000 barrels; bids soon.

Unstated, three storage tanks total capacity 450,000 gallons, for McNary dam, Oregon; Pittsburgh-Des Moines Steel Co., low for steel construction, $186,055, to U. S. engineer, Portland; alternatives also for wood construction.

PIPE . . .

STEEL PIPE PENDING

Unstated, about 30,000 feet 3 to 8 inch steel pipe, also fittings and elevated storage tank for water system, King County district No. 81, Kirkland, Wash.; bids to J. L. Harris, secretary, Sept. 7.

CAST IRON PIPE PENDING

350 tons, various sizes Moses Lake and Gig Harbor, Wash.; bids in, also alternatives for other types.

RAILS, CARS . . .

LOCOMOTIVES PENDING

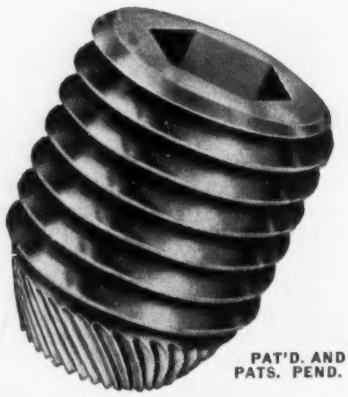
Central of New Jersey, fourteen 1500-horsepower diesel-electric locomotives; 12 for passenger service and 2 for freight service contemplated.

RAILROAD CARS PENDING

New York, Chicago & St. Louis, 500 fifty-ton box cars, bids asked.

Reading Co., 1000 seventy-ton hopper cars, inquiry withdrawn.

SELF LOCKERS



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CONSTRUCTION AND ENTERPRISE

ARKANSAS

EL DORADO, ARK.—Lion Oil Co. will construct in the next four months a $250,000 plant for the manufacture of protective coatings. The new plant will be an adjunct to the company's 22,000 barrel-per-day refinery.

CALIFORNIA

LOS ANGELES—Stor-All Corp., Akron, O., will establish a West Coast plant at 1715 W. Florence Ave., Inglewood, to manufacture portable steel storage units.

LOS ANGELES—Pacific Airline Equipment Co., Charles H. Toll, president, Chicago, has moved its metal fabricating plant to 3900 Burlos Ave., Burbank, Calif., where punch presses, shears, welding machines, large power tube bender and a paint oven have been installed.

LOS ANGELES—Pacific Valve & Pump Co., 2976 Cherry Ave., Long Beach, is constructing a plant at 3201 Walnut Ave., Signal Hill, to manufacture cast steel valves.

LOS ANGELES—Metalite Mfg. Co. has moved to 924 Thompson Ave., Glendale, Calif., for greater production of stainless steel hospital and dairy ware, aircraft parts, and for deep drawings, metal stampings and spinnings.

LOS ANGELES—Gilfillan Bros., 1815 Venice Blvd., has acquired a new building at 4801 W. Jefferson Blvd. to increase manufacturing facilities for radar equipment.

LOS ANGELES—Dunbar Bedding Co., 26 E. Colorado Blvd., Pasadena, Calif., is constructing a plant at 1631 S. California St., Monrovia, for expanded manufacture of furniture, mattresses and box springs.

LOS ANGELES—Willys-Overland Co., 6201 Randolph St., will spend $450,000 to expand facilities to produce two and four wheeled trucks and Jeep station wagons.

LOS ANGELES—Parker Appliance Co., 6506 Stanford Ave., will purchase Air Associates plant, 5827 W. Century Blvd. The company makes flared tube couplings and aircraft valves.

LOS ANGELES—Lawler Steam-Mobile, 7410 Long Beach Blvd., Huntington Park, has started making steam engines and parts for automobiles.

LOS ANGELES—R. V. S. Mfg. Co., Ralph V. Skarda, president, 1011 S. Seaman Ave., El Monte, has started to manufacture aircraft parts.

LOS ANGELES—Ilco Tube Bending Works has moved to 843 E. 31 St. Plans are being made to manufacture a line of chrome steel furniture frames for both commercial and residential use, and for special machinery to handle bending of materials up to 4 inches in diameter.

LOS ANGELES—Grow Mfg. Co., 3023 Riverside Drive, is erecting a building at 917 Western Ave., Glendale. The company makes aircraft and electric appliance gears, applications for electric motors, and does gear case work.

LOS ANGELES—Edmund A. Gray Co. Inc., 2277 E. 15 St., has built an addition to expand production of pipe nipples.

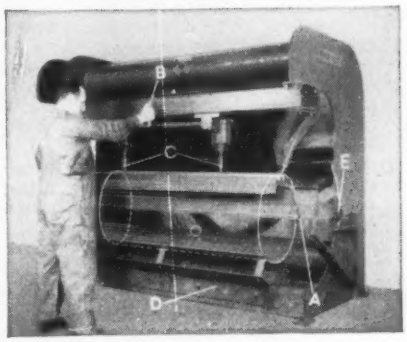
LOS ANGELES—Cook & Price has moved to 6714 McKinley Ave. to manufacture refrigerated truck, aircraft and air conditioning units.

LOS ANGELES—Los Angeles Die Mold has moved to 1332 S. Seaman Ave., El Monte, to manufacture plastic and die cast dies.

LOS ANGELES—Crown City Die Casting Co., 84 N. Fulton St., Pasadena, has constructed an addition to be used for manufacture of zinc die castings.

LOS ANGELES—Douglas Aircraft Co., Santa Monica, has set up a separate division for the manufacture of pressed metal products with Harry Woodhead as general manager. The new division will make automobile fen-

40 Welds with NO HANDLING OF THE WORK



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ders, radiator shells, and other automobile parts.

LOS ANGELES — Adel Precision Products Corp., Earthmaster Div., 12024 Center St., Hollydale, has added a building for increased manufacture of agricultural implements.

LOS ANGELES—Manlove & Christian Mfg. Co., 3524 Union Pacific Ave., has constructed a building to afford additional space for manufacture of aircraft parts and oil well tools.

LOS ANGELES—Barrington Welding & Machine Works, 1124 Border Ave., Torrance, Calif., is erecting an additional building to do welding and manufacture special machines.

LOS ANGELES—Lion Pacific Co., L. J. Cassou, president, 1452 N. Spring St., will move, upon completion of its new building, to 149 Sierra St., El Segundo, and manufacture sheet metal products and metal stampings.

LOS ANGELES—W. H. Trimm Mfg. Co., 1811 Johnston St., has built an addition for the manufacture of tool boxes, steel cabinets, radio chassis and steel parts, and metal display stands.

LOS ANGELES—National Screw & Mfg. Co., Cleveland, manufacturer of screws, nuts and bolts, has purchased the Apco Mfg. Div. of Lorraine Inc., 1649 Eighteenth St., Santa Monica.

LOS ANGELES—Taylor Forge & Pipe Works, Chicago, has acquired the former Kaiser shell plant at Fontana and will manufacture spiral pipe and heavy forgings.

ILLINOIS

CHICAGO—Hannifin Corp., 1101 S. Kilbourn Ave., manufacturer of precision hydraulic equipment, will add an additional unit to its plant.

CHICAGO—Saunders & Co., 2509 W. Cermak Rd., pipe and valve fabricators, have purchased an industrial plant containing two stories on 41,000 square feet of land at 3441 S. Lawndale Ave.

CHICAGO—Available Truck Co., 2501 N. Elston Ave., has started construction of an addition to its plant to provide about 50,000 square feet of floor space. Company manufactures trucks, truck tractors, crane carrier chassis, fire truck chassis, buses and heavy-duty automotive equipment.

CICERO, ILL.—Taylor Forge & Pipe Works, 4735 W. 14th St., has under construction a one-story brick plant addition which will enlarge present floor area about 15,000 square feet.

DEERFIELD, ILL.—Tracomotive Corp., which is nearing completion of the first unit of a factory for manufacture of road building equipment, has authorized an immediate addition to the plant providing 20,000 square feet.

EAST ST. LOUIS, ILL.—American Zinc Co., Fairmont City, has awarded a $100,000 contract to Murch-Jarvis Co., 718 Locust St., St. Louis 1, for construction of a charge house and warehouse.

FRANKLIN PARK, ILL. — Thompson Wire Co., 9470 W. King St., has under construction several one-story brick additions which will provide 16,000 square feet of additional space. Company engages in cold drawing of wire.

GENEVA, ILL.—Geneva Modern Kitchens Inc., 201 S. 8th St., has started construction on a one-story addition to its factory which will contain office and warehouse space for expanded output of its line of steel kitchen cabinets, stainless steel sink tops and accessories.

INDIANA

INDIANAPOLIS — American Foundry Co., Blaine Miller, president, 1535 Naomi St. has awarded a $1 million contract to Grove, Shepherd, Wilson & Cruge Inc., 411 N. Seventh St., St. Louis, for construction of a manufacturing plant.

INDIANAPOLIS—Glidden Co., P. Joyce, president, Berea and Madison Sts., Cleveland, plans to build an elevator and soyabean extraction mill costing $3 million at 1160 W. 18 St.; Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa., consulting engineers.

OHIO

COLUMBUS, O.—Sears, Roebuck & Co., 4640 Roosevelt Blvd., Philadelphia, is planning to construct a $5 million mail order plant and department store.

DAYTON, O.—United Aircraft Products, John M. Meyers, president, 1116 Bolander St., plans to make a $200,000 addition to plant 5; A. M. Kinney Co., Enquirer Bldg., Cincinnati, consulting engineer.

KENTON, O.—Timken Detroit Axle Co., 100 Clark St., Detroit, plans to build a $4 million factory one mile south of here.

PENNSYLVANIA

LANSDALE, PA.—Lansdale Tube Co., Tioga and C Sts., Philadelphia, has awarded a $100,000 contract to Henry E. Baton Inc., 1717 Sansome St., Philadelphia, for a manufacturing and laboratory addition; M. Ward Easby Inc., 1201 Chestnut St., Philadelphia, engineer.

PRICES OF LEADING FERROALLOYS PRODUCTS

(*Concluded from Page* 155)

c.l. and 0.9c for l.c.l.; Western, add 0.35c for c.l. and 1.5c for l.c.l. Freight allowed. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Eastern Zone, contract, carload, bulk, 8.7c per lb of briquet, c.l. packaged 9.5c, ton lot 10.3c, less ton 11.2c; Central, add 0.25c for c.l. and 0.6c for l.c.l.; Western, add 0.8c for c.l. and 2.5c for l.c.l. Freight allowed. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Eastern Zone, contract, c.l. bulk 8.75c per lb of briquet, c.l. packed 9.55c, ton lot 10.35c, less ton 11.25c; Central, add 0.25c for c.l. and 0.6c for l.c.l.; Western, add 0.8c for c.l. and 2.5c for l.c.l. Freight allowed. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Eastern Zone, contract, carload, bulk 5.1c per lb of briquet, c.l. packed 5.25c, ton lot 6.7c, less ton 7.6c. **(Small size**—weighing approx. 2½ lb and containing exactly 1 lb of Si). Eastern Zone, carload, bulk 5.25c c.l. packed 6.05c, ton lots 6.85c, less ton 7.75c; Central, add 0.25c for c.l. and 0.6c for l.c.l.; Western, add 0.45c for c.l. and 0.9c for l.c.l. Freight allowed. Add 0.25c for notching, small size only. Spot, add 0.25c.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18%, and Si 53-59%). Eastern Zone, contract, carload, lump, bulk 17.50c per lb of alloy, carload packed 19.0c, ton lot 19.8c, less ton 20.8c; Central, add 0.5c for c.l. and 0.85c for l.c.l.: Western, add 2.55c for c.l. and 2.6c for l.c.l. Freight allowed. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Eastern Zone, contract, carload, lump, bulk 16.25c per lb of alloy, carload packed 16.45c, ton lot 19.35c, less ton 20.85c; Central, add 0.5c for c.l. and 0.75c for l.c.l.; Western, add 2.55c for c.l. and 2.90c for l.c.l. Freight allowed. Spot, add 0.25c.

VANADIUM ALLOYS

Ferrovanadium: Open Hearth Grade (Va 50-55%, Si 8% max., C 3% max.). Eastern Zone, contract, any quantity, $2.90 per lb of contained Va.; Central, add 2c for c.l. and 3c for l.c.l.; Western, add 6c for c.l. and 9c for l.c.l. Freight allowed. Spot, add 10c. **Special Grade** (Va 50-55%, Si 4% max., C 1% max.), $3. **High Speed Grade** (Va 50-55%, Si 1.50% max., C .20% max.), $3.10.

Vanadium Oxide: All Zones, contract, less carload lots, $1.20 per lb of contained V_2O_5. Spot, add 5c.

Grainal: Vanadium Grainal No. 1, 93c; No. 6, 63c; No. 79, 45c; all fob Bridgeville, Pa., usual freight allowance.

TITANIUM ALLOYS

Ferrotitanium: (Ti 20-25%, Al 3% max., Si 4% max., C 0.10% max.). Eastern Zone, contract, ton lot, 2" x D, $1.35 per lb of contained Ti, less ton $1.40. (Ti 40-45%, Al 7% max., Si 4% max., C 0.10% max.). Ton lot $1.23, less ton $1.25; Central, add 4c for 20-25% Ti grade, and 2.1c for 40-45% grade; Western, add 13.5c for 20-25% Ti grade, and 7.2c for 40-45% grade. Freight allowed. Spot, add 5c.

Ferrotitanium, High-Carbon: (15-20%). Contract basis, per net ton, fob Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis, 6.8% C, $142.50; 3-5% C, $157.50.

TUNGSTEN ALLOYS

Ferrotungsten: (W 70-80%). Eastern Zone, contract, 10,000 lb W or more, $2.25 per lb of contained W; 200 lb W to 10,000 lb W, $2.35; less than 2000 lb W, $2.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Eastern Zone, contract or spot, 1000 lb or more, $2.90 per lb of contained W; less than 1000 lb W, $3.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloys: (Zr 12-15%, Si 39-43%, Fe 40-45%, C 0.20% max.). Eastern Zone, contract, c.l., lump, bulk 6c per lb of alloy, c.l. packed 6.75c, ton lot 7.5c, less ton 8.35c; Central, add 0.25c for c.l. and 1.1c for l.c.l.; Western, add 0.6c for c.l. and 3.95c for l.c.l. Freight allowed. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Eastern Zone, contract, carload, lump, packed 18.4c per lb of alloy, ton lot 19.15c, less ton 20.40c; Central, add 0.6c for c.l. and 1.05c for l.c.l.; Western add 3.05c for c.l. and 4c for l.c.l. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Eastern Zone contract, 100 lb or more. 1" x D, $1.20 per lb of alloy, freight allowed. Less than 100 lb $1.30; Central, add 0.75c; Western add 2.9c, freight allowed. Spot, add 5c.

Borosil: (3 to 4% B, 40 to 45% Si), $6.25 per lb contained B, fob Philo, O., freight not exceeding St. Louis rate allowed.

Bortam (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 0.90 to 1.15%). Net ton to carload, 8c per lb, fob Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Mn 5% max., Si 8% max., C 0.5% max.). Eastern Zone, contract, ton lot, 2" x D, $2.50 per lb of contained Cb, less ton $2.55; Central, add 1.65c; Western, add 6.45c. Freight allowed. Spot, add 10c.

CMSZ Mixes: (No. 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3-4.5%; No. 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.0%, Zr 0.75-1.25%, C 3.50-5%). Eastern Zone, carload, 12 M x D, carload packed 17.25c per lb of material, ton lot 18.00c, less ton 19.25c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.3c for c.l., and 3.05c for l.c.l. Freight allowed.

Silcaz Alloy: (Si 35-40%, Ca 9-11%; Al 6-8%, Zr 3-5%, Ti 9-11%, Boron 0.55-0.75%). Eastern Zone, carload, packed, 1" x D, 39c per lb of alloy, ton lot 41c, less ton 43c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.3c for c.l. and 3.05c for l.c.l. Freight allowed.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Eastern Zone, contract, carload, packed, ½" x 12 M, 15.0c per lb of alloy, ton lot 15.75c, less ton 17.0c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.3c for c.l. and 3.05c for l.c.l. Freight allowed. Spot, add 0.26c.

Graphidox No. 4: (Si 56%, Ca 5%, Ti 9%) C.l. packed, 16.50c per lb. of alloy; ton lots 17.90c; less ton lots 19.40c, fob Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%; V-7, Cr 28-32%, Si 15-21%, Mn 14-16%) C.l. packed, 12.95c per lb. of alloy; ton lots 14.60c; less ton lots 15.85c, fob Niagara Falls, N. Y.; freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al). Packed, lump, carload 11c, ton lots 11.25c, smaller lots 11.75c per lb alloy; freight not exceeding St. Louis rate allowed.

Ferrophosphorus (23-25% based on 24% P content with unitage of $3 for each 1% of P above or below the base): Gross tons per carload, fob sellers' works, Mt. Pleasant, or Siglo, Tenn.; $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb, contained Mo, fob Langeloth and Washington, Pa., furnace, any quantity 95.00c.